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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.*

With the opening of the present season a marked interest is being manifested by the mining community at large in the developments that are now going on in the gold and silver regions on the north shore of Lake Superior. The mines that have for the past year been successfully operated, and other mining localities that have been taken up, and are now being prospected, are so accessible and so conveniently situated to the base of supplies, as compared with those of the far Western States and Territories, that the time has arrived when approved methods for permanent mining should be inaugurated. Until this has been done profitable development will be delayed. The manner in which mining operations are to be conducted in this new field will, in a great manner, be determined by the methods adopted by those who have been the first to engage in mining industries in the district. Not only should modern machinery be erected, but good judgment should be exercised in selecting such machinery as is most suitable to the ore on which it is to be employed. The employment of skilled and experienced workmen under proper and economical business management are cardinal features to be observed in all mining industries. Mistakes will occur, but they are to be corrected, not repeated. The Lake Superior district is among the most inviting mining centres of the Dominion, its mineral resources are varied, and its gold and siver ores are rich in these precious metals. The value of the deposits having been assured, there should be a liberal and careful use of capital in developing them, and a prosperous future will be the result.

The Assistant Director of the Geological Survey of Canada, Dr. Robert Bell, sailed from Halifax on Wednesday, 27th May, on the *Alert*, in charge of the geological branch of the Hudson Bay Expedition. He will not return to Ottawa until late in the autumn.

Mr. William Pickford, London, England, President of the Phosphate of Lime Company, arrived in the city on 1st instant. Mr. Pickford had for some days previous been superintending the company's operations at its *High Rock* mine in Portland West.

Professor Edward J. Chapman, of the School of Natural Science, Toronto, paid us a visit a few days ago and expressed himself much gratified with the advancement in the mining industries of this district. Professor Chapman was in Ottawa attending the sessions of the Royal Society.

Mr. W. de L. Benedict, M.E., of the firm of Benedict & Cole, New York, paid us a visit last week. He was *en route* to New York, after having made a professional examination of the Fitzroy lead mine. Mr. Benedict has had much experience among the mineral deposits of Central Canada.

A special meeting of the shareholders of the Dominion Phosphate and Mining Company will be held at the office of the company, No. 8 Custom House Square, Montreal, on Tuesday, the 9th of June, proximo, at noon, for the purpose of considering, and if thought advisable, of increasing the capital stock of the company, or of authorizing the Directors to issue bonds of the company, as they may be required, for raising the means for contemplated increased operations, as authorized by the company's charter.

Many points of interest were touched upon by Professor Wm. Boyd Dawkins in the able address on the Canadian North-West which he delivered early in May before the Manchester Geographical Society. From his eminence as a geologist, most importance attaches to his remarks upon the undeveloped mineral wealth existing on the northern bank of the St. Lawrence Gold, silver and copper, he believed, were to be found in this region in valuable quantities, and in his opinion these deposits could, ere long, be fully worked, and the country peopled by large numbers of Englishmen.

MINERALOGICAL SOCIETY.—The science lecture room of the College of Ottawa was filled on the evening of May 7th, the occasion being the last regular meeting of the Mineralogical Society. The work of the year could not have been better completed than by the essay of Alf. Lussier, on the "Formation of Mineral Veins." He introduced his subject in a very lucid manner, exposed the various facts revealed by observation, and the many theories devised to explain them. The style contributed much to make the lecture interesting even to the most indifferent in the audience. A plan was afterwards devised for a scientific excursion to Buckingham, which has since taken place, on the 19th of last month.

The Hudson Bay Expedition, under command of Lt. Gordon, R.N., sailed from Halifax, N.S., on Wednesday, 27th May, on board the *Alert*. The expedition comprises five parties to be located at the stations which were established in the Straits last season. Dr. Bell, Assistant Director of the Geological Survey, has accompanied the expedition and will explore the geological and mineralogical features of the east coast of Hudson Bay, which are already known to be of interest and importance, and will return with the ship in the autumn. The *Alert* is particularly adapted to this class of navigation and was presented some years ago to the United States Government by the British Government to assist in the search for Greeley. She has recently been transferred by the United States to the Canadian authorities for service in the expedition in which she is now engaged.

The *Canadian Gazette*, London, England, in a recent number says: "Among the minor industries of the Dominion none has had a more rapid growth than phosphate mining. It is still in its infancy, but seems certainly to have a very satisfactory future before it. The deposits in the Ottawa district are of the chief importance, and some details of their development may be of interest. It is only a few years since the first mine was opened up: now, on the Lievre River alone, seven or eight are being worked. And whilst the export of phosphate in 1878 was only 3,700 tons, this year the total will be at least 24,000 tons. The introduction of improved machinery, as English, Canadian and United States capital has been attracted to the industry, has not only increased the output, but has also diminished the cost of production. Little doubt is felt as to the demand for phosphate keeping pace with any reasonable increase in the supply."

A very interesting article by Dr. Bell, Assistant Director of the Geological Survey, "on the mode of occurrence of Apatite in the Laurentian system in Ontario and Quebec," has appeared in a recent number of *The Engineering and Mining Journal. N.Y.* The article contains a vast amount of valuable information bearing on the apatite deposits in the phosphate belt, of which Dr. Bell says: "In the county of Ottawa is the most productive phosphate belt as yet known, running northerly and following the general course of the Rivière du Lièvre. It has been traced through the townships of Templeton and Buckingham, Portland, Bowman, Bigelow and Wells, and I have been credibly informed that the mineral has been found in places in this direction to a distance of 100 miles north of the *Ottawa* river. In the Perth and Kingston regions the phosphate belt runs from the township of North Elmsley, south-

ward through North Burgess, North Crosby, Bedford, Storrington, and into Loughborough."

His Excellency the Governor General with his Aides-de-Camp, accompanied by Dr. T. Sterry Hunt, of Montreal, and Dr. Grant, of Ottawa, visited the *High Rock* phosphate mine on Saturday, 30th May. The distinguished visitors were received by Mr. Pickford, of London, England, President of the Phosphate of Lime Company, and Mr. F. Hilton Greene, the company's Montreal agent. Flags were flying at the mine and in anticipation of the visitors' arrival some blasts were prepared and fired for their benefit. His Excellency and party were conveyed over the C. P. R. to Buckingham station and thence over the new branch line to the landing on the river, where they embarked in the steamer *Buckingham* owned by the Phosphate of Lime Company, and enjoyed a pleasant trip up the Du Lievre, which has become noted to tourists for its picturesque scenery. The distinguished party returned to Ottawa the same evening much pleased with the day's excursion and greatly interested with what had been witnessed at the mines. The passenger car which conveyed His Excellency and party from Buckingham station to the village was the first that had been over the new branch.

Dr. Selwyn, Director of the Geological Survey, has completed arrangements for the distribution of his staff of surveyors and field geologists for this season. Fifteen parties will be engaged in exploring and surveying, and the field of operation will extend from the Atlantic to the Pacific oceans. It is expected that this season's work will supply much valuable information and will enable the Director to complete many of the geological maps that are at present in an unfinished and imperfect condition. The parties will be distributed as follows:—Two in British Columbia, in Vancouver and Cariboo districts, under Dr. Dawson and Mr. Bowman, respectively; one, under Mr. McConnell, on the east flank of the Rocky Mountains; one on the plains, between Calgary and Edmonton, under Mr. Tyrell; one party, under Mr. Lawson, in the Lake of the Woods district; another, under Mr Ingall, on the north shore of Lake Superior, in the White Fish River silver region; Mr. Coste will have charge of a party in the gold and iron districts of the County of Hastings, Ontario; two parties will be engaged on the frontier of the Eastern Townships under Mr Ells and Mr. Adams, respectively; Mr. Lowe has already started out in charge of a party to continue the survey at Lake Mistassini; two parties are to survey in New Brunswick, one of which, under Mr. Chalmers, will work on superficial geology; and in Nova Scotia one party will be engaged in Pictou, Antigonish and Guysboro' counties, with Mr. Fletcher in charge. It is the intention of the Director to keep two parties employed during the summer in examining mines and collecting mineral specimens for the London exhibition, to take place next year, and his entire arrangements for the present season's operations of his staff have been carefully and thoroughly systematized.

ROYAL SOCIETY.

The fourth annual meeting of this distinguished body opened on Tuesday, 26th May, in the Railway Committee room of the House of Commons. The President, Dr. T. Sterry Hunt, occupied the chair and called the meeting to order. His Excellency the Governor-General, Honorary President of the Society, was present at the opening. Dr. Hunt, in his opening address, alluded briefly to the history of the Society since its foundation and to the services of its founder the Marquis of Lorne. The vice-President, Dr. Daniel Wilson, next addressed the meeting, and was followed by Dr. Chauveau, one of the ex Presidents of the Society. A vote of thanks to His Excellency for his attendance at the meeting, and his having consented to occupy the chair, was then moved by President T. Sterry Hunt, seconded by Vice-President Wilson, and carried unanimously amidst applause. In reply His Excellency delivered an eloquent and appropriate speech, touching briefly on the various subjects for study and research which should occupy the attention of members of the Society.

The Society held regular daily sittings, commencing at 10 o'clock in the morning, including Friday, 29th May, the last session, at which the election of officers for the ensuing year was proceeded with and resulted in the following gentlemen being elected:

President—Dr. Daniel Wilson, of Toronto.

Vice-President—Very Rev. Rector Hamel, of Laval University, Quebec.

Hon. Secretary—Mr. J. G. Bourinot, Clerk of the House of Commons.

Hon. Treasurer—Dr. J. A. Grant, of Ottawa.

The papers on geology and mineralogy read before the Society during the meeting was as follows:—

"*On a new Mesozoic Flora discovered by Dr. G. M. Dawson in the Rocky Mountains*," by Sir Wm. Dawson.

"*Illustrations of the Fauna of the St. John Group (No. 3)*, by G. F. Matthew.

"*On the Geology of Cornwallis or McNab's Island in Halifax Harbour*," by Dr. D. Honeyman.

"*Notes on the Economic Minerals of New Brunswick with revised list of mineral localities in the Province*," by Prof. L. W. Bailey.

"*On the Geology of South Eastern Quebec*," by Thos. McFarlane, and "*On the Geology of Thunder Cape, Lake Superior*," by the same author.

"*On the Wallbridge Hematite Mine, as illustrating the mode of occurrence of certain Ore Deposits*," by Prof. E. J. Chapman.

"*On the Fossil Plants of the Trias and Permian of Prince Edward Island, collected by Mr. Francis Bain*," by Sir Wm. Dawson.

"*On the Cambrian Rocks of the Rocky Mountains*," by Dr. G. M. Dawson.

The full texts of the above papers will be published by the Society for presentation at its next annual meeting.

El Callao: The product of this famous Venezuelan gold mine, we notice, has been gradually falling off during the last five months. It amounted to but 7,640 ounces, or $150,000, during March. The dividend was $2 per share, or $64,000, in the aggregate.

THE PHOSPHATE TRADE.

Since our last report of the phosphate industry of Ottawa county the ore has begun to move from the mines towards shipping point, and already a quantity has been forwarded to Montreal and some shipments have been made from that port to London and Liverpool. Since the ice left the Rivière du Lièvre steam tugs have been busily engaged in towing scows loaded with phosphate from the mines to Buckingham, and the Canadian Pacific Railway Company is carrying it thence to Montreal as rapidly as rolling stock can be provided and the unfinished condition of the Buckingham branch of the line will permit. This additional facility afforded to mine owners for the transportation of ore to point of shipment is a great improvement on former years, and although some delay has been occasioned, by the unusually late season, in ballasting the new branch line, it is well understood to be only temporary. The additional ore-crafts and tugs that have been put on the river since last season have been the means of reducing the cost of transportation to Buckingham fifty per cent., and the extension of the railway to that point has effected a still further reduction, so that the extreme cost of delivering phosphate from the most distant mines in the du Lièvre district does not now exceed $2.15 per ton, including hauling from the mines to the respective landings on the river bank where the ore is put on the scows. This represents a saving of quite $1.50 per ton as compared with the cost a year or two ago. The mines in the district were never more productive than they are to-day and the quality of the phosphate to go forward this season is of a higher grade than heretofore. As one year has succeeded another, so has it been one pleasant duty to record some improvement in the method of carrying on this important industry. The investment of foreign capital has done much to bring about changes that had been needed and to place phosphate mining on a more businesslike basis; but time and experience have shown where this capital was to be used to best advantage, and to-day we find that our phosphate industry has been almost thoroughly systematized so far as it extends on this side of the ocean. As to how the product of the mines can be most advantageously disposed of in the various markets abroad still remains an unsettled question and is a matter of too grave importance to be treated with indifference. It is admitted that under the existing system of purchase and sale a large margin of profit is returned to the mine owner, but under a better organized system his profits might be much increased. We have already offered suggestions on this point in the columns of the REVIEW, and we have learned that some contracts for this season's delivery have been made subject to conditions more favourable to the shipper. A satisfactory solution of this vexed question can only be arrived at by the concerted action of those who are most interested in the future of our phos-

phate mines, and until this has been achieved there will exist more or less dissatisfaction among shippers of ore.

THE MINES.

The present condition of the mines is most satisfactory and since our last report there have been many important developments. The force of men employed has not varied since the winter and mining is being proceeded with with the same activity and engery which has been noticeable for the past twelve months. Additional machinery has been erected at some of the mines during the past few weeks, and provision is being made for the transportation of ore to the river bank. In one instance it is in contemplation to construct a tramway, about 4½ miles in length, to enable the owners of the property to forward ore more rapidly and at reduced cost. Such substantial improvements as these are only decided upon after the deposits have been found to be of a permanent character, and the developments of the past year have conclusively proved this to be the case at all the mines in operation in the district.

The *High Rock, Star Hill, North Star, Little Rapids, Emerald* and *Battle Lake* mines have more ore in sight at the present time than ever before and are yielding abundantly. In no individual case, however, have so important developments been made as at the *North Star*. Some months ago the owners of this mine decided to test the depth of the deposits on their property and instructed their superintendent to put down a shaft with this object in view. Starting on a narrow string of phosphate, not more than 3 or 4 inches in width, he proceeded to sink and, irrespective of mineral, has continued his downward course until a depth of 165 feet has been reached. At a depth of 30 feet the vein had increased to about two feet in width, and from this level it varied between one and four feet wide until it was nearly lost sight of at a depth of 80 feet. Continuing down, with the one object in view, more or less phosphate was met with and at 120 feet below the surface the vein was again intercepted, measuring about one foot wide, from which point it gradually increased in width, and at the present depth of 165 feet the shaft is penetrating a body of phosphate, the dimensions of which cannot be ascertained. On all sides of the shaft, which is 20x8 feet, and the entire floor, is solid phosphate. The ore is of a dark green shade and perfectly free from foreign matrix, as was shown but a few days ago when one blast removed nine tons of phosphate, every pound of which was placed on the ore heap without cleaning or cobbing. This, together with the developments at the *Little Rapids* mine at a depth of 180 feet on a true fissure vein, has exploded the theory that Canadian Apatite is only to be found in pockets near the surface.

Reports have reached us that some virgin properties have been successfully prospected since the snow disappeared and extensive deposits uncovered. A few undeveloped lots have changed hands since the beginning of the year and will be prospected this season. Mining will be engaged in during the present summer by the *Glasgow Canadian Phosphates Company*, composed of Glasgow capitalists, who have acquired some property in Ottawa County, and we are informed of their intention to carry on extensive operations. We trust that good locations have been selected for this company and that the gentlemen whose money has been invested will realize the results which have been promised to them.

PHOSPHATE QUOTATIONS.

There has been little variation in the market abroad since our last report. Most recent advices from London and Liverpool quote one shilling for 75 per cent., with a fifth of a penny rise, and some contracts are reported at these figures. We are also informed of contracts having been made on Canadian weights and analyses, with moisture taken from weight, and this we consider to be the most desirable contract that shippers can make.

We are aware of one firm in England bidding for an annual contract for 10,000 tons of high grade. There is an expression of opinion abroad that the market will stiffen as the shipping season advances.

OCEAN FREIGHTS.

Tonnage has been freely offered since opening of navigation from Montreal to Liverpool and London at 3s. to 4s. 6d. per ton, and there is every indication that rates for this season will not rule higher than last year. This, together with the reduced cost of transportation from the mines to Montreal, will, to some extent, compensate phosphate shippers for the fall in the market value of the mineral.

The first phosphate shipment of the season from Montreal was made by Messrs. Wilson & Greene, Montreal, from *High Rock* mine, on 23rd May, on S. S. Oxenholme, to the Phosphate of Lime Company, London, England.

The first shipment of phosphate from Buckingham, over the new branch line of the Canadian Pacific Railway and thence, via main line, to Montreal, was made on the 22nd of May by the Ottawa Phosphate Company. The Phosphate of Lime Company, London, England, followed with the second shipment on the 23rd.

MOVEMENT OF FERTILIZERS FROM CHARLSTON, S.C.

	Tons, 1884.	Tons, 1885.
January	33,202	36,598
February	49,762	47,384
March	32,776	43,710
April	8,755	8,190
	124,495	135,882

Large deposits of tin ore have been discovered in Virginia; the veins are of great width and of richness. The United States is paying about $30,000,000 yearly for foreign produced tin. Americans hope that this great outlay will be made in the purchase of American tin in the near future.

The Origin of Phosphatic Mineral Deposits.

The following notes by a gentleman engaged in the shipping of guano and phosphatic rock from one of the West Indian Islands will doubtless prove interesting and instructive to those who have been studying the Laurentian apatite deposits in our neighborhood. Our correspondent states:

"On every one of the deposits so far worked a central hard rock has been found of a very high grade which has always been worked down to the sea level, and in the case of Sombrero and Pedro Keys, but more particularly the former, it has been mined below the sea level, and at Sambrero it is now being worked by divers—a sea wall having been built—and is being blasted considerably below the level of sea. These rocks I claim to be an original geological deposit of the Silurian period of the same age as the Laurentian range of mountains of Canada, which contains the apatite, the singular flags of Wales and the fossilized marbles of New Brunswick. In every instance mica is found in the neighborhood. These old rocks have a small quantity of free phosphoric acid attracted to the limestone and coral formations which invariably remain in them after the said limestones and coral have parted with their carbonic acid gas by the action of fresh water, fresh air and vegetable causes, forming, as a matter of course, a firm tri-calcic phoshpate.

As a positive proof that birds have nothing to do with this formation, I am now digging on land which has been in cultivation 100 years, have dug to the depth of 14 feet, swept the holes out with a broom, leaving exposed the whole limestone rock or matrix, and in three months after showers, and where birds never go, I can again gather a considerable crop of phosphate, so much so that I consider five years will now replace all that I have taken away. The growth is quite perceptible; but to quote one instance, the Pedro Keys were entirely worked out in 1856, were taken hold of again in 1862 and '63, and worked till 1867, again in 1872, and worked till 1875, again in 1878 and are still being worked. While I was there I had one piece of perfectly flat coral rock, about one-eight of a mile square, which I used to sweep once in four months and it gave me each time about 400 tons. This change was more rapid in the wet season than in the dry. It was on a part of the Key where no birds ever stayed, and on these grounds I have long since given up the idea that the bird deposit had anything to do with the present deposits in the West Indies. I consider all West India phosphate deposits come under two heads, the original geological deposit, as a Silurian strata, and the matamorphic rock, which has been changed in times past and is being changed now."

CANADA'S MICA MINES.

The increased demand for mica which sprung up some two years ago, and the advance in price, consequent thereto, did much to stimulate prospectors and explorers in their search for deposits of this mineral. The result of these explorations has been the discovery of mica deposits in various parts of North America, where its existence had not been previously known, and in no part of this continent have such valuable discoveries been made as in Canada. Though by no means numerous, the deposits that have been located in this country are extensive and of much importance, and the quality of the mica,

has been pronounced by the best authorities of Europe and the United States as inferior to none that has ever been offered to mica dealers. Selected samples of East India, ruby and white, and New Hampshire and North Carolina mica have been forwarded to us for comparison with some that has been produced at a Canadian mine, and the result has been most favorable to the latter, after submitting samples of the five different specimens to the various tests by which the quality of mica is determined. In point of resistance to heat, cleavage and transparency, the Canadian samples stood the most crucial tests equally with any of those from the other localities above referred to, and much more satisfactorily than some. In fact the experiments to which it has been subjected have proved it to be of the very highest standard—and the crystals are of large sizes.

At the *Pike Lake* mine, in the township of N. Burgess, county of Lanark, a very excellent quality of white mica is being produced, and the sizes of the plates that are being shipped from this mine are considerably above the average of shipments from other mines.

In the township of Loughborough, county of Addington, there has been a large production of mica, of a dark amber shade, which appears to have found favour among certain dealers and stove manufacturers both in Canada and the United States.

The *Villeneuve* mine, situated in the township of Villeneuve, county of Ottawa, is, beyond any question, the most valuable and important mica property yet discovered in Canada. During the past eight months it has been undergoing development and is now a steady producer of the best Canadian mica we have seen. The samples that were tested for comparison with East India, North Carolina and New Hampshire mica, to which we have referred, were forwarded to us from this mine. Several tons of crystals of various sizes have already been taken from the tunnel and shaft, and a large number are now exposed, some of which are quite two feet square. Within the past few days we have received a number of plates, measuring 12x12 inches, of as beautiful mica as has ever been produced, which can at any time be seen at this office. This mine is destined to become a very heavy producer and is an exceedingly valuable property.

As stated in our last number, two important deposits of excellent white mica occur in the township of Miller, county of Frontenac, and in the township of Maison-Neuve, county of Berthier, respectively, on which, however, no development work of any consequence has yet been done.

BEAUCE MINES.

We have not been officially informed recently of what progress is being made in the Beauce gold fields. The latest report that has reached us bears date May 9th and gives an encouraging account of what has been done on the Gilbert River and on Slate Creek since the snow and frost disappeared. In the last mentioned locality some good work had been done at the *Allan & Humphrey* mine, and the shaft was penetrating rich ground a short distance, it was supposed, above bed-rock, but at the time our correspondent wrote washing had not begun. A fair quantity of coarse gold was being taken from the allavial washing on the Gilbert, and the Canada Gold Company was continuing to prospect the quartz veins in Rigand-Vandreuil. In the parish of Liniere exploration continues among the silver-bearing ridges and a vein, on which Mr. Torrance was working last autumn, has been thoroughly prospected and its continuity for some miles has been established. Already a number of claims have been located along the bearing of the lead and rich ore has been taken out, samples of which we have seen. It is not unlikely that this season will witness considerable activity in the district and that several companies will be organized for permanent mining.

ASBESTOS MINING.

Towards the end of April work was resumed at the Asbestos mines of the Eastern Townships and has since been proceeded with vigorously. The *Johnson* and the *Boston Asbestos Packing* companies have put on an additional force of workmen and look for a corresponding increase to this season's output of their mines in Thetford over that of last year. Before mining was begun in the spring the entire output of the *Johnson* mine had been contracted for ahead, and we are informed that other mine owners have already disposed of all they can produce up to the close of the season, and at same prices as last year. This is attributed to a sudden demand having sprung up during the Anglo-Russian crisis, and it still continues. From the mines of Thetford, Colerame, Broughton and Danville, it is expected that the shipments this season will exceed those of any former year, and as many undeveloped properties will be opened during the summer the Canadian Asbestos mines are destined to contribute largely towards supplying the world's demand in the future.

FITZROY LEAD MINE.

This mine has been actively worked during the past eighteen months and is now fairly developed. The mine is situated on an island formed by two branches of the Mississippi River at their junction with the river Ottawa, and about two miles from the village of Galetta, in the township of Fitzroy and county of Lanark, N.R. A shaft has been sunk on a vein of galena, in limestone formation, to a depth of 45 feet, and the continuity of the vein, which is about six feet wide, has been proved.

The vein matter yields from 15 to 20 p.c. of galena carrying about 3 oz. of silver to the ton. The mine is worked exclusively for lead and the ore is forwarded to Kingston for smelting. About 25 miners are employed and it is expected that a large amount of ore will be shipped during the present season.

IRON MINING.

With the exception of the *Coe Hill* mine, situated at the northern terminus of the Central Ontario Railway, and the *Bristol* mine in Pontiac county, there was little activity at the iron mines of central Canada during the past winter. At *Coe Hill* 75 miners have been employed since ore shipments ceased last autumn, whilst the *Bristol* mine gave employment to about 40 men. At both of these mines the force of miners is now greatly increased, nearly doubled, and during the present season of navigation it is to be expected that large shipments of ore will be made to the United States—that from *Coe Hill* to Cleveland, Ohio, via Ontario Central Railway to Weller's Bay, where the company has extensive docks and ore-pockets, and thence across Lake Ontario; and that from *Bristol* mine over the Canadian Pacific and Kingston and Pembroke Railways to Kingston, from which point it will be forwarded to the company's works at Charlotte, New York State.

Other mines contiguous to the Ontario Central Railway will be actively worked during the present season, we are informed, and we hear of another property in Pontiac, not far distant from the *Bristol* mine, on which, in all probability, development will soon begin.

In the section of country now penetrated by the Kingston and Pembroke Railway large deposits of excellent magnetic and hematite ore abound, and with the facility for transportation now afforded by this railway, recently completed, there exists no reason why development work should not be proceeded with forthwith. The only reason we can think of why such a move has not already been reported to us is that the best properties have fallen into the hands of people who have not sufficient capital to develop them, or that they are being held by speculators. That these deposits could be profitably worked and would become important producers of iron ore there is no doubt; that they should be allowed to continue in their present undeveloped state is to be regretted.

Plymouth Consolidated Gold Mining Company.

We have on several occasions referred to the successful operations of this company at its mines in Amador county, California, and are indebted to the president, Mr. VanNorden, for a copy of the company's quarterly report, dated April 1st, which reached us immediately after the publication of our last number, on May 1st. It gives evidence of this company's continued prosperity and of the intelligence and economy with which its operations are conducted. The report reads as follows:

Gold Bullion produced January, 1885	$85,721 93	
" " February, 1885	80,974 87	
" " March, 1885	80,135 03	
Total product for three months, 1885	$246,831 83	
Operating expenses for same period	81,930 90	
Profit		$164,900 93
Cash on hand, January 1st, 1885		74,295 66
Amount applicable to dividends		$239,196 05
Paid dividends for quarter, Nos. 20, 21 and 22, $50,000 each	$150,000 00	
Construction Account, three months	5,639 58	
		$155,639 58
Cash Surplus, April 1st, 1885		$ 83,556 47

The cash on hand, $83,556.47, is *actual surplus*, the company having no indebtedness whatever.

Since the annual report was issued, the main shaft has been sunk for a new level, No. 5. Drifting for the ore was commenced at a point 100 feet below No. 4. The ore will be reached early in May.

The tunnel running south on No. 2 level, is 766 feet long, measuring from the Pacific shaft.

The new Woolford shaft is down 233 feet, with a body of ore seven feet wide, milling about nine dollars per ton, including sulphurets. This vein is 600 feet east of the main mine, and is slowly improving as greater depth is reached.

The mother of the first child born in Eagle City, Arizona, received a present of $5,000 in gold dust from enthusiastic miners of that region.

Burchard's special report on the output of United States mines during the year 1884, places the total amount of gold product at $30,800,000 and the total of silver at $48,800,000.

GOLD MINING IN INDIA.

The India gold mines created quite a "boom" in London some four or five years ago, and vast sums of money were invested in the wildest manner on mere "prospects." There was in fact not a single paying or developed mine in the gold district when the boom was at its height. It is almost needless to say that the "prospects" in very few instances only found any gold, and the crazy investments in worthless property and impossible mills were almost all lost. A year ago, a single company, the Mysore Gold Mining Company, was at work, for it alone had an unexpended balance of working capital of £13,000 ($65,000), and since it had never paid any thing, there was every probability that it too would stop, and that India gold-fields would sink out of sight until the next mining craze in London. It appears that the Mysore Company has at last struck "pay," and has obtained 1,887 ounces of gold from 1,318 tons (2,240 pounds) of ore, or nearly 1½ ounces per ton. The cost of obtaining this is not stated, but the effect of its production is a sudden movement to reconstruct the moribund companies that have mines in India, and more capital is going into other properties on this slender basis. We hope the Mysore Company will make a great success; but if it should, it would be none the less true that the original investment in the India gold-fields, and even in the Mysore Company's undeveloped property, was of the wildest and most irrational kind, and the greater part—we hope not all—of it will naturally and inevitably be permanently lost.—*E. & M. Journal, N.Y.*

GOLD MINES OF AUSTRALIA.

The Victoria gold mines are in a prosperous condition, though no remarkable discoveries have been made during the past year. From the Mining Registrars' reports for the quarter ended December 31, 1884, we learn that the gold yield for the year 1884 was 778,618 oz. 7 dwt. 22 grs., or about $15,572,367, counting the gold at $20, or £4, per ounce. During the last quarter of the year, the yield was 200,788 oz 16 dwt. 13 grs., say $4,015,796, which was a considerable increase on the corresponding quarter of 1883. The registrars report the mining industry as prosperous, and that the production will probably increase during the coming year. Seventy-eight gold mines paid during the quarter $1,132,895 in dividends, equal to about 28 per cent. of the entire production.

The mining population of Victoria is estimated at 28,430, of whom 12,988 miners were employed in quartz mining and 15,442 in alluvial mining. Of the total mining population, 5,369 were Chinese.

The value of all the machinery employed in the various mining operations in the gold field was estimated at £1,888,214, or $9,441,070. A large number of diamond drills are now in use.

The three deepest shafts in the colony at the end of 1884 were, Magdala Company, 2,409 feet; Lansell's 180 mine, 2,041 feet; Victory & Pandora Company, 1,940 feet.

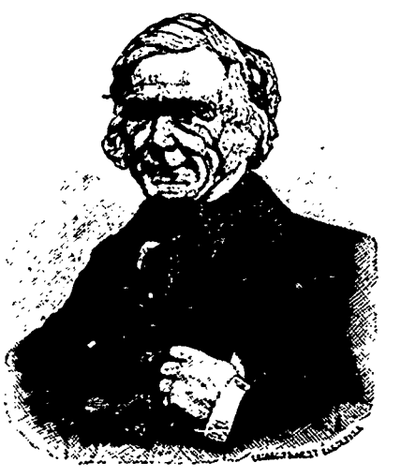
The Victoria gold fields appear to have a permanent future in quartz mining, for a vast number of reefs of low grade but paying ore have been found, and though the operations are in general on a small scale, they have, as above mentioned, been attended with profit.

The average yield of certain lots, amounting to 223,691 tons of quartz milled in the last three months of 1884, was 10 dwt. 5.96 grs., say $10.30 per gross ton.

The Late Sir William Edmond Logan

In March number of THE REVIEW we published some reminiscences of this distinguished scientist, and we take much pleasure now in presenting to our readers a portrait of the great geologist, produced from a photograph taken in the year 1870, and which will be more readily recognized by his host of friends than those of him which have been published from photographs taken at a more recent date.

Sir William was born in the city of Montreal on the 20th April, 1798, was educated in Scotland, at the Edinburgh High School, and in 1817 he entered his uncle's counting-house in London, England. Dr. Harrington, in his "Life of Sir William," says: "For about ten years the great and busy metropolis was Logan's home, and it is to this period that we must look if we would obtain a view of many of his traits of character, which in later life only came to the surface at intervals. If, like his four brothers, he never married, and if for years he lived much in the seclusion of his study, or far away from the busy haunts of men, often with Indians as his sole companions, it was not from any want of appreciation of domestic comfort or happiness, not that to him society was devoid of charms. He was no misanthrope.



The Late SIR WILLIAM EDMOND LOGAN, Knight, F.R.S., F.G.S., L.L.D.
(Born 20th April, 1798, died 22nd June, 1875.)

But as he advanced in life, the cause of science, which he had espoused, became more and more a ruling passion, and often masked his true nature and disposition." In 1831 he removed to Wales where he engaged in copper smelting at Morriston, near Swansea, and it was there he began the study of mineralogy and geology. In 1837 he was elected a Fellow of the Geological Society. In 1842 he was appointed to the position of Provincial Geologist of Canada and assumed the duties of office at Kingston in August of the same year. This appointment was the origin of the present Geological Survey of Canada. In 1851 Logan was elected Fellow of the Royal Society, in 1855 he was presented by the Emperor of France with the Cross of the Legion of Honour, and on the 29th January, 1856, was knighted by the Queen at Windsor. About this time he was awarded the Palladium or Wollaston medal—the greatest honour the Geological Society has to bestow.

From the day of his appointment to the office of Provincial Geologist, up to the time of his death, Sir William's life was one of untiring devotion to his labours in the field of science. He identified himself with the interests of his native country, and endeared himself to all who had come into personal contact with him. To testify their appreciation of the valuable services he rendered to Canada, his fellow-townsmen of Montreal presented him, in 1856, with a testimonial in the shape of a massive silver fountain bearing the following inscription:

In commemoration of
His long and useful services as
PROVINCIAL GEOLOGIST IN CANADA,
and especially his valuable services in connection with the
EXHIBITION OF ALL NATIONS
in London in 1851, and in Paris in 1855, by which he not
only obtained higher
honour and more extended reputation, but largely
contributed in
making known the natural resources of his native country.
This Testimonial was
PRESENTED TO
SIR WILLIAM E. LOGAN, Knight, F.R.S., F.G.S., L.L.D.,
by many of the inhabitants of Montreal,
desirous of marking their respect and esteem for one
of the most distinguished of their
fellow-citizens.
Montreal, July, 1856.

Beset on all sides by difficulties and disadvantages Sir William continued to prosecute the work of the Survey with that zeal and energy which had ever characterized the man, and after serving the country for upwards of a quarter of a century his resignation was tendered to the Government in January, 1869. It was with feelings of deep regret that the public received the announcement of Sir William's retirement, and never was the *press* of any country more unanimous in its expressions of approval at the career of a public servant. After his retirement from active employment Sir William made frequent trips between Canada and Great Britain and in August, 1874, he sailed from Canada for the last time and went to visit his sister at Castle Malgwyn, Wales, where he died on 22nd June, 1875.

Logan was not only a Fellow of the Royal Society of London (1851), the Royal Society of Edinburgh (1861), and the geological societies of London and Edinburgh (1867), but also a member of the geological societies of France (1842) and Belgium (1874), of the Imperial Leopoldo-Carolinian Academy of Germany (1857), the Philadelphia Academy of National Sciences (1846), the Marine Historical Society (1847), the Academy of Sciences of St. Louis (1857), the American Academy of Arts and Sciences, Boston (1859), the State Historical Societies of Wisconsin and Iowa (1859), the American Philosophical Society (1860), the Buffalo Society of Natural Sciences (1863), etc. He received the honorary degree of Doctor of Civil Law from the University of Lennoxville in 1855, and that of Doctor of Laws from McGill University in 1856. He was also the recipient of more than twenty medals, awarded to him on various occasions as a recognition of his scientific work.

BRITISH COLUMBIA.

MINING NOTES.

Reports from Lorne Creek are encouraging. Fifty-seven miners are on the creek, and others are prospecting in the neighborhood.

An extensive discovery of silver has been made at Yam Creek, Northern Territory. There is ample wood and water on the ground for machinery.

Explorers and prospectors who have spent year after year in the province have discovered unmistakeable indications of silver, all of which remain quite undeveloped.

Capt. McFarland and Mr. Caulfield arrived in Victoria on 7th May from the north, having come down for the purpose of procuring the requisite machinery for hydraulic mining.

There are reports to the effect that rich gold diggings are a certainty in the Kitsum-Kayhun country, and that white and Indian miners are making preparations to thoroughly work the new find.

Mr. McCullough, of Victoria, a short time since sent three specimens of silver ore from the interior to San Francisco for assay, and has received returns from two of the specimens assayed, $28.27 and $29.85 to the ton, respectively, and the third $161.85 in silver.

Mr. H. B. Dart, of Boston Bar, has picked up a nugget of pure gold weighing about 6½ ounces. While walking over his ranche he noticed a piece of quartz slightly above the ground, and hammering out the rotten quartz he found a large irregular piece of gold, which now looks like a honeycomb with the quartz separated from it.

It is stated that two French gentlemen, M. Gérard and M. Péande St. Giles, will explore a portion of the Rocky mountains and the Selkirk range during the coming summer. They are on a mission of scientific enquiry, and will probably issue a report to the French Geographical Society on the mineral wealth of the province. After visiting Cariboo and the other mining centres they will descend the Fraser, examine the copper veins on the Semilkameen, and arive in Victoria about July. They will then proceed to the coal district, and will also examine the iron deposits on the islands. M. Gérard is a mining engineer and it is to be hoped that his visit will result in the introduction of French capital into the province.

A large number of miners started north on 15th May for the mines on Lorne Creek, and those on the newly discovered creek in the same neighborhood, and the recent strike on Kitsum-Kayhun. Mr. J. S. Graaf, an old California miner, who spent the whole of last winter at the mines states that they are far richer than has been reported, and fully 2,000 men could go in and make good money. The late strikes would seem to fully endorse this statement, and probably such success will be met with this year that there will be a *boom* in the northern mines next season. They are easily and cheaply reached; supplies are also reasonable, and operations may be carried on during the greater part of the year, there being only five weeks of severe weather in December and January to contend against. The reports from the miners have been few, but all are favorable, and treble the number have already gone in this year. The prosperous days of the past may be repeated at the rich diggings that are being developed on the northern coast.

Mr. B. Bailey, in a letter to the *Colonist*, Victoria, says that the company of which he is a member, after prospecting for five years, has struck a well defined lode of silver ore sixteen feet in width and traceable by outcroppings 4,500 feet. So far as Mr. Bailey is able to judge from experimental results, he says that galena, gold and silver predominate. He adds that the lode is so extensive and rich that it will soon attract the attention of the world. The company is now running a tunnel and expects to strike the lode in three weeks. The locality is on Scott river, eight miles from Shuswap lake, in the mountains. A wagon road can be made from the steamboat landing to the road. Writing two days subsequently, Mr. Bailey says:—"We have broken through the outer crust and come upon a black seam of ore some two feet in width which resembles oxide of silver. Above, or between the outer and lower seam, was a six-inch stratum of honeycombed quartz thickly coated with chloride. I am well convinced in my own mind of its worth; but will wait patiently for a test, and shall forward samples to California for assay."

On the 1st March, Messrs. Donohue, Roundy, and McArthur, with some half dozen other white miners, and ten Indians started on a prospecting tour. Following up the Sheeaxe river from the Naas to the lakes, they discovered two creeks, which they prospected with success. These creeks empty into Kitsum-Kayhun lake. Three weeks ago a long letter was received from the miners, stating they had good prospects—and would take up claims. The Indians came for a new supply of provisions, and brought some of the new gold with them; they returned and will take up claims. The white miners would not advise any great rush until they have further prospected the surrounding country. News will be given in a short time in regard to it. These creeks are easy to reach; the Indians walked out in two days—the white men call it 50 miles starting on a trail commencing 10 miles above tide water on the Naas, following the stream, and then crossing three lakes. Boats can be placed on these a distance of 17 miles, so that supplies can be freighted in. The men believe they have struck a rich country. It is reported 10 cents a pan is being panned out. It is near where Mr. W. Madden discovered gold last fall.

LAKE SUPERIOR MINING NOTES.

As stated a month ago, arrangements have been made for starting three new mining and manufacturing companies. Two of them will begin operations this spring in the Rabbit Mountain district and one on the main shore at Port Arthur.

Parties who have recently come in from the Silver Mountain region are a unit in their opinion of the richness of that section. Several new discoveries have been made since the snow left the mountains which are reported to be of importance.

Capt. Wheeler has proceeded to the Zenith Zinc mine with a party of thirty miners, and a number of Indians to man the canoes and pack in supplies. Work was commenced at this mine last year and prospects were sufficiently encouraging to warrant these preparations for permanent mining.

Those who have been watching with interest the development of the Twin City mine are pleased to know that the result of the past year's work has so encouraged its owners that they have decided to erect and equip a stamp and concentrating mill, arrangements for which were expected to have been completed by the end of May.

The result of the winter's work at the Beaver mine is said to have been very encouraging, and satisfactory progress continues. The Superintendent boasts that the vein has never "gone back on him" since he opened it, and that it is a steady producer of silver ore. New roads are being made to the mine which will shorten the distance between it and Port Arthur.

Messrs. C. G. Kimball and John McGuire, of St. Paul, arrived in Port Arthur last month *en route* to the silver region. The object of their visit was to inspect the mines in operation through the district, the owners of which are much gratified with the developments of the past six months and are anxious to have them examined by practical miners whose opinions would be of value.

At the Rabbit Mountain mine work has advanced through pay ore to the boundary line of the company's property. A shaft is also down as far as the engines now in use can take it, and pending the result of negotiations now in progress for the purchase of the adjoining property the company has decided to confine its operations to surface prospecting. If the purchase be made, new engines and a stamp mill will be erected without loss of time, the capacity of which will depend on the result of the negotiations referred to. The company has been collecting its smelting ore for shipment, a consignment of which will shortly go forward to New York.

The Huronian mine at Jack Fish Lake is unquestionably the most important and the richest gold location in the Lake Superior district. The vein on this property has been exposed for a distance of over 2,000 feet and measures from 4 to 12 feet in width. It is a true fissure vein of gold-bearing quartz in a gangue of talcose slate and has been thoroughly prospected. A shaft has been put down to a depth of 150 feet and drifting has been carried for about 100 feet, also on the vein. There is a ten stamp-mill, a steam hoist, saw mill and blacksmith's shop on the property, and their plant is quite inadequate to the capacity of the mine. Some of the ore has yielded as high as thousands of dollars to the ton, but the vein matter taken from the shaft and drift, all the way from the surface to the lowest point reached, has returned $20 to the ton, and there can be no doubt a large per centage of the gold was not secured, owing to the imperfect machinery in use. Such a property as this should be in the hands of a strong company with ample capital to proceed with mining operations on an extensive scale, and to work to the best advantage. Under such conditions it would pay enormously.

Does mining pay? This question may to some extent be affirmatively answered by the fact that $5,000,000 were received during 1884 as dividends by those engaged in gold mining in the colony of Victoria.

A Monster Gold Nugget.—A nugget of gold weighing 21 pounds (about $5,000) has been found at the Berlin diggings, Victoria, and brought into Dunolly by two miners. The gold field was celebrated for nuggets some years since, and the present year will no doubt lead to the discovery of others.

Idaho mines produced nearly $9,000,000 in gold and silver during 1884. The product for 1885 will exceed that amount. The mineral field in this territory is above 8,000,000 acres. This includes gold, silver, copper, iron, lead, antimony, mica, cinnabar, tin, soda, salt and other products.

The copper products of the United States were 30 per cent. more in 1884 than in 1883. The largest gain was in Montana, which territory produced 44,500,000 pounds against 24,000,000 in 1883. In Arizona the increase was 2,700,000, and in the Lake Superior country 8,800,000.

THE GREAT FOREIGN COPPER MINES.

The influence of the decline in the price of copper upon the profits of the small number of mines that control the market for this metal is a subject of great interest; for it shows approximately the limit of profitable price and the cost of production. This information concerning our great foreign rivals is still more interesting and important.

The following table we have condensed from the London *Mining World*, and have added the quotations of the shares of the companies at the beginning of the present month. Under the recent advance in Chili Bars, a corresponding advance has taken place in the shares :—

Year.	Tharsis. 187,333 shares Par £2. Dividend per cent per annum.	Tharsis. 187,333 shares Par £2. H.	Tharsis. 187,333 shares Par £2. L.	Rio Tinto. 525,000 shares Par £20. Dividend per cent per annum.	Rio Tinto. 525,000 shares Par £20. H.	Rio Tinto. 525,000 shares Par £20. L.	Mason & Barry. 185,161 shares Par £10. Dividend per cent per annum.	Mason & Barry. 185,161 shares Par £10. H.	Mason & Barry. 185,161 shares Par £10. L.	Panulcillo. 50,000 shares Par £1. Dividend per cent per annum.	Panulcillo. 50,000 shares Par £1. H.	Panulcillo. 50,000 shares Par £1. L.	Price of copper. Chili Bars. H.	Price of copper. Chili Bars. L.
1879.....	16½	31½	21¼	5	10	7½	....	1	....	3½	6½	4	63	53
1880.....	30	34½	23½	8	19½	12½	....	....	....	9½	6⅞	3½	73	63
1881.....	35	48½	35	11	28⅝	19½	25	....	....	10	7	4½	71	58
1882.....	27½	45½	36	11	31½	22	12½	18⅜	....	15	7	5	71	63
1883.....	27½	74	61⅝	11	23½	18½	12½	17½	15½	12½	5⅞	3½	64	58
1884.....	20	7	5⅞	8	21	12	8	13⅛	13	nil	2	2½	58	47½
May, 1885.....	....	41	4	....	8	7½	....	7½	8	....	2	1½	44	43

*Rio Tinto has also £2,500,000 of 5 per cent. mortgage bond.

The decline in profits is not, however, to be counted as varying in direct proportion to the price of copper; for as prices decline, many economies are introduced and the cost of production per pound of copper declines. The production has been greatly increased by most of these companies, and a still heavier increase is promised.

The Rio Tinto is undoubtedly the greatest, though perhaps not the most important, factor in this question. The most important factor is the great company nearest the stopping limit.

This, the greatest mine in the world, is estimated, according to the president's address at a recent meeting of the stockholders, to have reserves of ore amounting to 150 million tons, and its dumps are stated to contain 46,000 tons of 2,352 pounds, or 108 million pounds of copper. This stands the company in £6 7s. 6d. per ton, or about *one cent* per pound. The cost of extraction by the company's lixiviation process is small, and it has already extracted 33,000 tons of copper from these dumps. It is not, of course, to be expected that the entire contents will be saved; but the process, though a slow one, extending over years, extracts finally a very high percentage of the metal, and at a low cost. The company mines about 5,000 tons of ore daily, and this year has contracted to supply 400,000 tons to the acid-works of England, France, Germany, etc., and will treat at the mines over one million tons.

The average copper contents of the ore mined last year was 3·23 per cent by wet assay; but the company expects to receive from 2¼ to 2½ per cent. on the 400,000 tons sold for the sulphur. This, at present prices, would amount to about 18s. per ton, and the sulphur is worth about as much more.

According to the president's report, the Rio Tinto expects to produce about 59,000,000 pounds of copper this year. Of this, 15,000 tons of 2,352 pounds will be produced by the company at the mines, and about 10,000 tons will come from the 400,000 tons of pyrites already contracted to acid-works.

We glean from the president's address that the cost of the 15,000 tons of copper produced at the company's works, delivered in London, will be *about five and one half cents per pound*. This, however, does not include "interest and sinking fund expenses for bonds," nor "expenses of administration." We may add to the list of companies cited above, the Cape Copper Company, which has 20,000 shares with £8 per share paid in, and which was quoted in London at the beginning of the present month at £30 to £31.

The Calumet & Hecla, with its capital of $2,500,000, say £500,000 of capital, in $25 shares, worth $16 per share at the beginning of the month, holds its own well with its foreign rivals. This company expects to produce from 46,000,000 to 48,000,000 pounds of copper this year from a 4½ per cent. ore yield.

The great Anaconda, with its immense deposit of ore, which is yielding on an average say 10 per cent., and with its magnificent works, will probably produce 35,000,000 pounds of copper this year.—(*Engineering and Mining Journal, N. Y.*

COPPER MARKET REPORT.

BY

S. RAUNHEIM,

234 Pearl Street, New York, May 14th.

The condition of the copper market since my last report has improved; in fact, more copper was sold to consumers in the last three weeks than during three months before.

The price of Lake copper is firm at 11½ cents: of other brands, about 10¾@11 cents, according to quality. At the same time, the price of Chili Bars has advanced in London from £43 to £45½, and a further advance would not be surprising, when the facts of the decrease of the American production become generally known, or should the manipulations of the European contractors for American copper and furnace materi l cease or be defeated by a counter move.

It is remarkable that a lot of Lake copper was sold in London at £55, two weeks ago, while Chili Bars were held at 43½, equal to a difference of £11½. This constitutes a handsome profit to the French syndicate, whose purchase price for May delivery is about £48. I am positively informed that the current price for Lake copper in Europe is £55½. Any returns of such copper from Europe to this country are hereby prevented. Furnace material at the disposal of our refineries remains scarce. The production of such material in Arizona is a very small one. Reports concerning the Copper Queen mine are not favourable. The Old Dominion Company has closed its works. This relieves the market of one million pounds copper annually—to be regretted in the interests of the shareholders. The Globe mine shows large reserves of ore, and, according to the statement at the last meeting of the shareholders, the copper laid down here costs 6¾ cents per pound (of pig-copper), a profit of about $25,000 a month.

The management in such hands as Professor Trippell and A. Harnicknell was an excellent one, and no doubt was entertained as to their ability to pay off the most pressing floating debt of the company during the next six months by actual profits made on the run of the furnaces. Unfortunately, the creditors, Pope, Cole & Co., of Baltimore, had to go into liquidation. The financial mismanagement of a former board weighs upon the present administration, chiefly composed of parties representing the Simpson estate at Boston, which owns $568,000 mortgage on the Old Dominion Company's properties. Should the large shareholders be unwilling to render assistance, the mines may come under foreclosure and shareholders be frozen out. It would lead me too far to dwell on the reasons that have brought about such a result in a good mine. It is the old story: too much water in a mine may be overcome, though expensive to get out; but too much water in the stock is simply ruinous, even if applied to the best mine.

The Montana production during the first four months of this year, already fallen off three million pounds, will of course remain below the estimate; but, as principal mines run again in full blast, this year's production will come up certainly to last year's.

The same may be said about the Lake companies, the increased output of the Calumet & Hecla and others coming up to the falling off from the closing of several other Lake mines.

Exports from the United States to Europe during the first three months of 1885 were:

6,786 tons of ore and matte, valued officially at.....	$ 831,000
5,410 tons of ingots and bar copper, valued officially at.....	1,257,000
Total.....	$2,088,000

Corresponding to about nineteen million pounds of fine copper contents, or more than one half of our entire production. This statement confirms my latest reports, and proves our copper market to be in a very healthy condition.

New Copper-Manganese Alloy.

Engineering says: The French "Société d'Encouragement pour l'Industrie Nationale," at its meeting on December 26th, 1884, offered a prize of 1,000 francs for the discovery of a "new alloy useful in the arts." This prize has been awarded to M. P. Manhès, now so well known for his successful application of the Bessemer process in the metallurgy of copper, on account of his discovery of the value of an alloy of copper and manganese for improving the quality of commercial copper. It is stated that copper always contains more or less sub-oxide of copper irregularly disseminated throughout its mass, and that in consequence of this it loses some of its tenacity. M. Manhès prepares an alloy of 75 per cent. copper and 25 per cent. manganese, and adds it in small quantities to the molten copper after refining, and just before casting, stirring the bath of metal at the same time. The manganese of the alloy is stated immediately to combine with the oxygen of the dissolved cuprous oxide, forming a manganiferous slag which is easily removed. The operation is cheap, and very much improves the quality of the copper so treated. Also several of the principal alloys of copper, bronze, gun-metal, and brass are of superior quality when prepared with copper purified in this manner. It is stated, too, that a series of experiments has proved that copper so treated

is much better suited for sheathing ships' bottoms than ordinary copper, as it is more slowly acted upon by the sea-water. On these grounds the committee of the society has awarded the prize to M. Manhès.

PRICES FOR MINING SOFT COAL.

Reports have been received by the *Coal Trade Journal*, N.Y., from a large number of mining localities throughout the United States, showing the prices paid for mining, the width of seams, size of screens, etc. As these reports are too voluminous to publish in full the *Iron Trade Review*, Cleveland, O., has constructed the following table of comparison showing the widest ranges in the several items referred to:

State.	Width of Seam. (feet.)		Price for Mining per ton.		Size of Screen.	
	Largest	Smallest.	Highest.	Lowest.	Largest.	Smallest.
Alabama	3	2½	$1.00	$ .62½	3	1
Colorado	12	...	1.12	.62½	1¼	...
Illinois	12	2½	1.25	.35	1¼	½
Indiana	7	2½	.87½	.40	1	1¼
Iowa	6	4	1.00	.62½	1	1¼
Kansas	3½	1½	1.85	.62½	1	...
Kentucky	6	4	.70	.38	1¼	1¼
Missouri	4½	1½	1.15	.91	None.	None.
Ohio	12	4	.87½	.46	1¼	1¼
Pennsylvania	12	3½	.60	.35	2	1¼
Tennessee	5	2½	.70	.50	1¼	1¼
Virginia	24	1½	.91	.35	1½	½
W. Virginia	14	3	.56	.40	...	...

These reports are not, of course, intended to be complete, as will be seen by the fact that the highest price reported from Ohio is put at 58¾ cents per ton, whereas the present rate in some districts is 75 cents; nevertheless they are of much interest to manufacturers and others and worthy of preservation. In several instances the price has been reduced from the bushel to the ton standard.

FAMOUS DIAMONDS.

The Amsterdam firm of J. Metz is busy with the erection of a special workshop, in which the cutting of the largest diamond of the world is shortly to begin. This diamond, which has recently been found in South Africa, weighs 475 carats, and is said to be greatly superior in color and brilliancy to all the other famous diamonds of the world, the largest of which, the "Grand Mogul," is in the possession of the Shah of Persia, weighing, after being cut, 280 carats. Next in size follows the "Orloff," of 195 carats, which adorns the point of the Emperor of Russia's scepter. The English "Kohinoor" originally weighed 116 carats, but in its present form is reduced to 102¾ carats. The "Regent," one of the French crown jewels, weighs 136⅜ carats. The time spent in cutting this last jewel was two years, during which time diamond powder to the value of £850 was used. The "Star of the South," which has been cut at Amsterdam, weighs 125⅞ carats.

In eight months ending November 30th, there were imported into India, in excess of all exports, gold bullion and coin amounting to $20,396,980, or at the rate of about $30,600,000 a year.

The power of Niagara Falls, exclusive of the velocity with which the water reaches the brink, is calculated to be 5,000,000-horse power, or nearly one-fourth of the whole steam power of the earth.

Asbestos, its Manufacture and Uses.

(Continued from page 11, Vol. 3, No. 3.)

So much for the first branch of the manufacture, which, although commercially very valuable, yields in interest to the second. Asbestos yarn may be worked up in a hundred different forms, serving as many different uses, while the paper appears to be chiefly serviceable for making joints, though it is now used also for making fire-proof partitions and for other building purposes. It may not be that we shall ever reach the time when our under-garments will be purified by fire instead of by the laundress' art; but short of this, many uses now filled by materials the thorough cleansing of which can only be secured by their destruction may, possibly, be better served by asbestos.

We must now go back to the point in the process where the cleaning of the fiber ends. That description of raw material designed for the manufacture of yarn is discharged from the boiling-tanks into hydro-extractors. There all the free water is thrown out, and the drying is completed by steam heat. The fiber is then taken to a "shaking" machine, which separates the long fiber from the short, the latter being sent into the millboard department, and the former to the "carding" room. But its appearance is scarcely encouraging to one who has been accustomed to cotton or wool. These latter staples, examined under the microscope, exhibit a notched or serrated appearance, which explains the ready way the material clings together when twisted. But with asbestos, this structure is entirely wanting, and therefore the problem of twisting it into a thread presents special difficulties, which are rendered more evident when its behavior in the breakers and carding-engines is watched. Instead of leaving these in a sheet or "lap" it drops out in separate fragments, just as it entered, except that the fibers are combed out straight and laid side by side, parallel with each other. In spite of this, however, the carding is accomplished in several successive machines, each set to a finer gauge than the preceding. It is a difficult task to describe machinery of this class intelligibly, even with the help of engravings, to those who are totally unacquainted with it, and it would take more space than we have at disposal to describe the relative offices of card cylinders, lickers-in, and doffers. It is sufficient to say that the entire process is one long-continued brushing or combing, in which cylinders covered with teeth of gradually increasing fineness pass the fibers from one to another, continually drawing them out, until all knots and irregularities are eliminated and they lie straight and parallel.

The last machine is that known in the woolen trade as the condenser. Its final cylinder is covered with rings of card filleting with bare zones between them. The fibers are stripped from these rings by a reciprocating knife called a "fly-comb," and in the case of worsted are delivered in a number of parallel filmy tapes on to a travelling apron. Above this apron is a second, travelling in contact with it at the same speed, and having in addition to its forward motion a sideways or reciprocating motion. The tapes are fed forward between the two aprons and are at the same time rolled or "condensed" into threads. They are not spun, as there is no regular twist, but may be compared to threads of putty or dough rolled between the palms of the hands. The asbestos, as we have already explained, will not cling together upon mere contact, and consequently it leaves the last card cylinder as fragments rather than tapes. These fragments are neatly gathered into rows upon the apron by reciprocating scrapers, and are then condensed as they proceed to the coiling cans. This is a part of the process that has required the most time and money to work out, and it was only after a long course of experiment that a carding and condensing apparatus was devised that was successful in producing satisfactory threads.

From this point, the manufacture of the yarn is simple. It is spun upon slubbing or roving-frames, such as are used in the cotton trade, except that no effort is made to draw it. These frames have a "positive take-up," and do not put any strain upon the yarn until it is twisted, when its tensile strength is very great, as the individual fibers are much stronger than those usually met with in spinning operations. The three remaining processes are doubling or twisting, braiding and weaving. In the first, a number of yarns are laid together, and are twisted into a cord or rope. This is generally used as the core of a braided packing, and is inclosed in a plaited cover by a machine of the usual construction, or the packing may be braided from the centre with fine threads. If a square packing be desired, in place of a round one, this is attained by the device of using four smaller cores around the central one. These extra cores are fed up through the heads around which the braiding spindles revolve in their mazy course, and are securely bound on to the middle core in such a way that the finished strand is of square section. One form of round packing is produced in a smallware loom, and is a specialty with the United Asbestos Company. It consists of a parallel or slightly twisted core, surrounded by an annular envelope of straight longitudinal warp threads bound together by a fine weft, which is drawn tight in the weaving and sinks into the soft centre, so that it is not exposed to wear until the covering is nearly destroyed. The result is an exceedingly elastic gland packing that has a fine bearing surface on the rod, and is capable of easy and rapid manufacture.

The asbestos cloth is woven in a loom exactly like calico, except that the reeds and healds are much coarser. The narrow cloth or tape is woven in a smallware loom. Both the sheeting and the tape are used for making joints, and the former is sometimes rubber-proofed to render it water-tight. The asbestos and India-rubber woven tape is so constructed that it can be bent around a corner without puckering, and thus is particularly useful in making joints in man-hole and mud-hole doors. If the cloth or tape be rubbed with plumbago or powdered asbestos before it is used, the joint may be broken and remade many times with the same packing. The cloth is also worked up into square gland packing by being cut into strips and built into a square rope with a backing of pure rubber to give additional elasticity. The edges of the strips lie in contact with the rod, and as the gland is screwed home, the compression of the rubber feeds the asbestos forward, so that a large proportion of the whole bulk can be actually worn away by the continual friction before new packing is required. It is scarcely necessary to detail the many other forms of gland packing that can be made, as it is evident that all the forms hitherto manufactured in cotton can be made with asbestos yarn.

The indestructibility of asbestos renders it serviceable for many miscellaneous purposes. It is used for filters and strainers both for domestic purposes and for chemical liquids. It is manufactured into drop-curtains for theaters, furnacemen's aprons and leggins, firemen's clothes and gloves, and ladders and ropes for fire-escapes. As a lining for deed-boxes, it serves to convert them into portable fire-proof safes; and lastly,

it has attained a very great celebrity as the basis of a fire-resisting paint.

Throughout the whole of this article, we have spoken entirely of Italian asbestos. But there is a considerable trade in the Canadian material, which is lower in price. The hard and distinctly mineral structure of the American variety undergoes quite a different preliminary treatment from the softer silky texture of the Alpine product. The color of the cleaned Canadian fiber is a dead white, the staple is not long, and the peculiar greasy feel that we noticed above is absent."

On a Possible Genesis of the Canadian Apatite.

By G. Henry Kinahan, M.R.I.A., &c.

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

In an inquiry of this nature it appears expedient to establish a known basis to which reference can be made; we will select the Irish Lower Palæozoic rocks, as with them our knowledge is more intimate than those of elsewhere, and at time compare phenomena observed in Canada with those studies among them.

From my brief explorations among the Canadian rocks, it appeared that the apatite rocks, but especially those rich in the mineral, were confined to a band or group of a limited width; this being made up of an association of various eruptive rocks both in beds and protrusions, calcareous rocks of different kinds, and schists; among the latter there being subordinate quartzytes, while more generally they were micalytes, talcytes, chlorilytes, or such like. The eruptive rocks that specially belonged to the group seemed for the most part to be more or less basic; such as granitona, diabase, gabbro, and the varieties of euryte (*Daubuisson*), or the hybrid rocks of *Durocher*. There are, however, protruding into these rocks different granitic rocks, also rocks apparently much younger, such as the dyke in the heave line at the Emerald Mine, in the vale of the Du Lièvre.

Some poorer apatites occur in beds as apatitic schists: similar accumulations have elsewhere been called *dradge lodes*.* The rich accumulations, however, occur in true lodes having two walls, in lodes with one wall (half lodes), in bunches, lay and lay, and as string or small irregular veins.

The true lodes appear nearly invariably to have selvages at both walls, either a fluean (steatitic clay) or a steatitic schist, in part they have a comb structure, but more generally the apatite appears to fill the fissure; but having scattered through it minerals, the more conspicuous being stacks or crystals of blackish mica and veins of pyrrhotite.† In one lode was observed a vein of quartz (*cab*), which appeared to be more or less parallel to the walls, and associated with it were crystals of various minerals. Some lodes or portions of them, seemed to be typical "dradge lodes;" but at the same time there did not appear to be any "vein-stuff" that could be classified as a regular typical "gangue:" in some deposits, however, especially the bunches, limestone came in, more or less irregularly, the apatite graduating into limestone; while in the latter were apatite crystals, some of great size, the largest known at the time (August, 1854,) being 800 lbs. weight, as exhibited at the office of the Mining Review, Ottawa.

The half lodes may have either a foot or a hanging wall with a selvage; near which the ore appears to be richest, the veins as it recedes from it becoming dradgy, and eventually merging into the country rock. It should be mention that the country rock outside the walls of both the true lodes and also the alf lodes may be more or less apatitic. From the state of the working it cannot be satisfactorily seen whether the ore in the lodes occurs as *courses* or *shoots*, but it probably occurs in both ways.

Some of the bunches occur in connection with the lodes, they have accumulated in "vugs" that joined into the lode; others, however, seem to be independent accumulations. Of the latter some are in more or less regular masses, but others send of, or break up, into irregular branches or veins. The lay and lay, as with other minerals, occur as layers in the planes of the stratification or the structures; while the strings and small irregular veins are like those filled with other minerals. From the foregoing it will be seen the deposits of apatite are more or less like those of galena in some limestone districts; while they are also like some of the accumulations of limestone dolomyte or allied rocks in the Lower Palæozoic rocks of Ireland, as will be presently mentioned.

The "back" or "gossan" of the apatite lodes is ferriferous; probably principally due to the decomposition of the pyrrhotite and mica; the "gossan-colour," however, has peculiarities of its own, being somewhat like that of a coppery gossan, but at the same time quite distinct. It is very hard to describe it in words, more especially as in my experience I have scarcely met two persons who see colours similarly. It is, however, like the —— colour of the Irish; that is, a mixture of yellow and brown with a purplish tinge. As far as I could see, the "back" seems to be usually sandy, sometimes clayey in depth; becoming more purplish, due to it being mixed with apatite sand*: while on the back of a bunch the "broken" and "hard shelf" are stained more or less with the typical "gossan-colour." A good knowledge of the gossan-colour and the nature of the back seems to be of great importance to the explorers, as on account of the frailty of the mineral the backs of the lodes are of more or less depth; while many of the bunches seem not to come to the surface, and their position must be guessed at by the colouring of the broken and hard self.

That the archæan rocks of Canada are to be separated from other metamorphic rocks and are to be supposed to have accumulated in their present crystalline states, appears quite unnecessary, as they make and are similar to other metamorphic rocks of various ages. In that little bit of the earth called Ireland, are found rocks identical with the majority of these Canadian rocks; which can be demonstrated to belong to the Cambrian (*Primoidal*) Cambro-Silurians (*Ordoicincian*) and Silurians. Neither does it appear necessary to insist that lithological character, not even when they are also accompanied by a distinct break, constitute a petrological or stratigraphical boundary; as portions of the rocks of a group may be more altered than others, while a protrusion of granyte or any other exotic rocks, when altered along with those associated, will have a hard boundary, and probably will appear as if older, while in reality the original protrusion was younger than the rocks which it now underlies.

In the Croaghan-Kinshelagh district, counties Wicklow and Wexford, Ireland, there are rocks that have been subjected to a more recent period of metamorphic action than any that invade the adjoining rocks, the results being that these rocks are now as much altered as many of the Canadian Archæan Rocks; yet petrologically they belong to the uppermost or youngest Cambro-Silurian strata—rocks which some few miles to the N E. are unaltered. In Ireland we can also see the relations between metamorphosed protrusions and their associated sedimentary rocks; good examples being exposed in the Slieve Croob district, County Down, and the Castlebar district, County Mayo, where there were protrusions of granyte that are now altered into gnesis, having had boundaries* between them and the associated metamorphosed sedimentary rocks. As already mentioned in the archæn gneissose rocks of the Ottawa county, there is a band or group of strata made up of schists, eruptive rocks and varieties of calcareous or allied rocks; in it the valuable accumulations of apatite have been found, and the well-marked characters of this group are more or less analagous to those of bands or groups in Irish lower palæozoic rocks. Of the latter the best marked group is the middle division (*Eruptive series*) of the Cambro-Silurian, as seen in south-east Ireland (Counties Waterford, Wexford and Wicklow). Here it consists of eruptive rocks in bedded masses and protrusions, tuffose rocks, calcareous and dolomitic rocks, argillytes, micalytes, talcytes, with subordinate quartzytes and metalliferous schists; such as pyritilytes, graphityte and calcareo-ferriferous schists. The eruptive rocks are in a great measure similar to those in the vale of the Du Lièvre, Ottawa county, except that paramorphosis has more altered the latter.

(*To be Continued.*)

*Coppery schists in West Cork have been called "dradge lodes." This Cornish term, however, I believe, ought correctly to be confined to a true lode, in which the mineral occurs as specks or spots irregularly in the vein-staff.

†This has very much the appearance of nickeliferous pyrrhotite, but in the specimen brought home none was found.

*The upper portion of the apatite lodes under the back, or what would be called in a copper or sulphuric mine the "gossan lode," seemed to be a cemented or re-arranged purplish apatite sand, in which are irregular crystalline pieces of the green variety.

*This gneissic granyte of County Mayo is more or less similar to the Labradorian or Norian gneiss of Eastern Quebec, and other Canadian localities. The protrusions, however, are mere specks in comparison, as some of the Canadian protrusions are larger than any of the Irish provinces, or perhaps of the whole of them.

THE METAL MARKET.

Messrs. E. W. Carling & Co., of 16 Philpot Lane, London, England, report under recent date:—

A fair amount of business has been done in these commodities. Copper and Tin further advanced, more particularly the latter, but have since receded.

Copper.—Chili bars, good ordinary brands, £44 12s. 6d to £45; Wallaroo and Burra Burra, nominal; English, tough, £48 to £49; best selected, £49 to £50; strong sheets, £56 per ton.

Tin.—Fine foreign, cash; straits, £83 17s. 6d. to £84 7s. 6d.; English ingots, £88.

Tin Plates.—Charcoal, I C, 17s. to 20s.; coke I C, 13s. 6d. to 16s. per box.

Lead.—Steady; English Ordinary Brands, £11 5s. to £10 17s. 6d.

Spelter is easier, £13 10s. to £13 12s. 6d.

Quick Silver is dull; £5 12s. 6d. in first hands and £5 11s. 6d. in second hands.

Iron.—Scotch pig, 41s. 10½d. cash.

Antimony—Regulus, £39 to £40.

Yellow Metal.—Sheets, (4x4 ft.) 4 9/16d. to 4 5/8d.; sheathing, 4 5/8d.