

# THE CANADIAN MINING JOURNAL

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## The Canadian Mining Journal

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### ANNOUNCEMENT

The publishers beg to announce that "*The Canadian Mining Review*," which has so long and so honorably identified itself with mining affairs in Canada, has been incorporated with "*Canadian Mining Journal*."

In taking this step the publishers were actuated by the conviction that it would be decidedly better for the whole mining fraternity to have one responsible national periodical.

The "*Review*" has in its lifetime done excellent work. It has helped to make history.

The "*Journal*," it is hoped, will, with ampler opportunities, carry on the work in a larger field.

### THE CANADIAN MINING JOURNAL

#### ITS OPPORTUNITY, AIM AND PURPOSE

At no time in the history of industrial development in Canada has the outlook appeared more favorable than at present. The country is enjoying in full measure a wave of prosperity, the effect of which is manifest in the phenomenal increase in trade activities, the extension of markets, the expansion of manufacturing interests, and the ready disposition of outside capital to seek investment in Canadian undertakings. This prosperity is general and widespread. It accurately describes conditions from seaboard to seaboard and is applicable with equal truth to all Canadian industries. In mining, however, in whose welfare we are concerned in particular, the recent advances and improvements have been gratifying to a degree, and all indications now promise an extraordinary revival of interest. In this belief the publishers have considered the occasion opportune to introduce to the public a new mining journal, national in range, of which the present is the first issue. It is thought that there is opportunity and wide scope for a periodical such as it is proposed *The Canadian Mining Journal* shall be, and the many expressions of encouragement and approval already received from men of eminence and position in the engineering and metallurgical professions, mine managers and others, have confirmed this view.

It is customary with the first appearance of a periodical for the publisher to make some pronouncement of aim and purpose. We conform to this convention; but we trust ere long to substitute achievement for promise. The aim, then, of this Journal is to supply a recognized demand. Without intending disrespect to our contemporaries, all excellent in their way, there does not exist at the present time a periodical ostensibly devoted to our mining and metallurgical industries which can lay true



claim to be really representative of those interests, or to comprehensively cover the wide field of Canadian endeavour in these directions. *The Canadian Mining Journal* starts its career under favorable auspices. It has no special interests to serve, no prejudices to obstruct its usefulness, and it is untrammelled by considerations of financial disability in providing the necessary machinery by which to accomplish its purpose. Hence, in the understanding that the first function of a newspaper is to publish news, arrangements have been completed to secure reliable information at first-hand by the engagement of a staff of resident and travelling correspondents, the majority of whom are technically trained men, in whose independence of view and general trustworthiness we have every confidence. A number of the most eminent specialists in Canada have also generously consented to lend their services in advisory capacities and will, moreover, act as special contributors to these pages. In this connection, it may be mentioned in passing, that *The Canadian Mining Journal* hopes to create a new departure in Canadian technical journalism in respect to the remuneration offered contributors to its columns. Heretofore too much advantage has been taken of the good nature of our leading scientists, who have been asked to write for Canadian papers on the ground that they would thus display a meritorious public spirit. But modern conditions of struggle and competition, "something for nothing," is anomalous. It is neither fair to ask nor just to expect such concessions; and *The Mining Journal* hopes to substantiate its conviction that journalism in Canada can thrive without dependence on charity.

We have alluded to the recent revival of mining in Canada; but while this implies material progress of industry, the discovery of new and rich mineral territory and the extension of the productive area, we do not lose sight of the fact that this very improvement is responsible for "boom" conditions, which, as they are likely to react to the detriment of legitimate undertaking, are to be deplored. This exuberant state of affairs, however, is natural and inevitable; but it remains for the press—and in this respect *The Canadian Mining Journal* sees its duty very clearly—to unhesitatingly assume the task of safeguarding the public interests by fearlessly setting its face against "wild-cattling," and the machinations and misrepresentations of the fraudulent company promoter. British Columbia in general, and Rossland in particular, have scarcely yet recovered from the ill-effects of the bursting of the "boom" bubble of eight years or so ago. The Cobalt "boom" promises to assume still greater dimensions. Although the undoubted richness of the area warrants enthusiasm, it is safe to assume that a considerable proportion of the properties in which the public are being invited to invest—some of them in fact, described as Cobalt mines, are not even situated within the boundaries of the district, cannot pay to work, and their promoters have no false ideas on that

score. This, and the speculative inflation of values, are clouds on the horizon; and it rests largely with the technical and financial press to avert the threatening storm.

In making itself an organic part of Canada's industrial life, *The Journal* will strive to follow intimately the rising generation of technical men. There are few who realize the valuable work which our technical colleges are doing, in supplying year after year highly-trained engineers, chemists and metallurgists. There are fewer who appreciate the tremendous importance of keeping these young men within our own borders, of training them to meet our own industrial problems. Thus and only thus may Canada fulfil her destiny.

With this brief introduction we bespeak for *The Canadian Mining Journal* favor and support. We shall hope to establish between our readers and ourselves sentiments of common regard.

If by our efforts and their co-operation we are able to assist in the upbuilding of a great Canadian industry, that, we feel, will be a privilege indeed, an incentive to work and effort in the widest sense and a high goal at which to aim.

#### EDITORIAL NOTES

An important change in the tariff, announced on the 11th inst., provides for a 99 per cent. drawback on bituminous coal, when imported by proprietors of smelting works and converted at the works into coke for the smelting of metals from ores. An ancient proverb tells us what the good dame remarked when she contributed her mite to the industrial resources of Scotland.

The necessarily superficial character of much of the geological and prospecting work done in Canada is now and then accentuated by the discovery of rich deposits in districts which have been explored and settled for many years.

The recently announced discovery of cassiterite in Lunenburg county, Nova Scotia, emphasizes the need and utility of constant and intelligent search for mineral deposits.

The field geologist is too hard-worked to indulge in detailed prospecting. But what he can do is to delimit the field for the prospector. Apparently this discovery of the valuable mineral cassiterite is due largely to the intelligent work of Mr. Faribault.

The demand for tin is constantly increasing. The supply is, on the other hand, practically stationary, and, as the reserves are diminishing, the metal is gradually rising in price.

In nearly all the tin-producing regions of the world cassiterite or tinstone, as it is commonly called, is the chief tin-bearing mineral.

Cassiterite is a black, brown or colorless mineral. In most instances the color is black or brownish. When black it shows a metallic lustre, when brown its lustre is resinous. Its streak, when rubbed on a rough unglazed porcelain surface, is never black, but varies from white to chocolate brown. It is hard, though very brittle and friable. Its brittleness easily gives a mistaken idea of



its hardness. It is heavy, and, therefore, easily separated by panning from most of the minerals usually associated with it. In situations it occurs in sizes ranging from a grain up to individual pieces weighing one or two pounds.

Almost invariably cassiterite is found in veins cutting granitic rocks. Usually these veins are of quartz. The minerals topaz, fluorite, tourmaline, wolframite and arsenical pyrites (mispickel) are generally associated with the cassiterite. In these cases the cassiterite is of secondary origin.

But instances are known in New South Wales and the Dakota Black Hills where tinstone has been found in pegmatite as an original constituent of the rock. Presumably, the recently discovered tinstone in Nova Scotia falls under the latter category.

In a recent issue of *The Monetary Times*, some caustic remarks are made regarding certain alluring mining advertisements, which are to be seen in the daily press.

General and vague condemnation is, no doubt, valuable; but it fails of its purpose. A sure, though perhaps Utopian remedy, would consist in the concerted movement of the press against advertising any but *bona fide* mining companies.

It may devolve upon *The Canadian Mining Journal* to take specific action in the not remote future. Distasteful as this duty is, it must occasionally be done, if the best interests of the mining industry are to be conserved.

Meanwhile *The Journal* strongly recommends the excision of a few of the most efflorescent advertisements from the pages of otherwise responsible newspapers.

Knight-errant of a century that knows no romance, the prospector hits the lone trail for the tall uncut. Razorless, he perforce must grow a beard. Persecuted by the ubiquitous mosquito, suffering all the ills of exposure and privation, he eats his dough boys, smokes his twist and is content. Impelled by an urgent faith, he perseveres and fails and is forgotten, or, he finds and is famous.

Unsuccessful, he is spurned and flouted. Successful, he is fawned upon, flattered and not infrequently spoiled.

A badly regulated thirst is a not unusual concomitant of the first flush of achievement. For this the one specific is a return to the bush.

But, levity apart, his country owes to the fearless, tireless prospector a surprising debt of gratitude. Were it not for his fervid enthusiasm, Canada would not now be reaping the rich harvest of Cobalt, not would she be taking her place among the great mineral producers of the world.

Laws are made with an eye single to the glory of greedy corporations; lobbies are vocal with the clamorings of special interests. The broker, the banker, the miner and the operator howl to the legislative moon when all things do not fit their fancies.

But the prospector, unprotected, uncaring mayhap, is silent. He cannot organize, he does not strike. He dies strange deaths in lone lands. Hymned by no bard, unsung of poets, the prospector is girding up his loins against another season of peril and flapjacks. We wish him God-speed! Prosperity be with him! *Prosit!*

The present agitation over the Ontario Government's proposed taxation of mines will supply much polemical pabulum to the press. From a controversial standpoint, the question is a somewhat torrid one.

*The Journal* wishes to encourage not controversy, but (so far as may be) dispassionate constructive criticism.

The conditions under which Ontario mining legislation has been framed must be kept in mind. No body of laws can be final. They must be a growth. Additions and amendments should be made only after mature consideration. A regulation which appears innocuous and even beneficial now, may develop a surprising sting in course of time. We have a body of mining men organized under the name of the "Canadian Mining Institute." These men are responsible citizens. Why should not the "Institute" be consulted in matters so vitally important to its members' welfare? We can think of no more capable, no more representative organization. It includes men who are versed in every phase of mining activity, and it embraces a wide diversity of interests.

We do not for a moment impugn the motive which inspire Ontario's legislators. It is probable that the objectionable features of the proposed bill have not been promptly enough nor strongly enough represented to the Government.

But even the eleventh hour is not too late. Let the Government step warily. It is making or marring for all time.

From the nature of his work the practical foundryman meets with difficulties which are surmountable only by the expenditure of much time and energy. One by one, he must encounter obstacles which to him are new, but which have, in modified forms, been met by many before him.

The key to some of these difficulties is held by the chemist, the solution of others is the property of foundrymen of riper experience.

Although there is a tendency to-day to call upon the chemist for incidental help, in relatively few cases is the function of applied chemistry recognized.

And, on the other hand, the experienced foundryman is apt to look upon his knowledge, knowledge gained in the rough school of experience, as his own peculiar property.

There are, in Canada, several active foundrymen's associations. These do much good. But, we believe, that an association organized upon a national scale, with active local sections, would inevitably improve the character of foundry practice.

Few establishments are large enough to justify the maintenance of a laboratory for their own work. But it is entirely practicable for a group of foundry owners to support an efficient chemist.

And the chemist in no sense supercedes the practical man. He merely provides a ready remedy for difficulties; he offers a short cut to efficiency.

Further, nothing can take the place of constant interchange of opinions and advice. The progressive man must be alive to this. A progressive industry must establish a community of interests among its workers.

A bill, entitled "An Act to Supplement the Revenues of the Crown," was given its first reading before the Ontario Legislature on February 13.

In the preamble it states that large sums of money have been and are being expended by the Province in administering mining affairs, encouraging mineral industries and opening up railways and other facilities to mining regions, therefore it is expedient to increase the revenues of the Province.

The bill accordingly provides that every mine in the Province, the annual profits of which exceed a certain



sum, shall be liable for an annual scaled tax, adjusted in proportion to such excess annual profits.

It further provides for the imposition of an acreage tax on all mineral locations and mining claims in any unorganized territory of the Province.

Clause 23 of the bill provides that in case any doubt arises as to the liability of any person to pay a tax under this Act, the Minister of Mines may compromise the matter by acceptance of such amount as he may deem proper.

Taken in its entirety, the bill is cumbersome. It is, moreover, inopportune. Undoubtedly it has been inspired by an honest and not unnatural desire to secure for the Province a larger share of Cobalt's riches. In attaining this end the framers of the bill have overlooked the inevitable effect that such an enactment would have upon mining interests generally.

That it would tend to divert foreign and domestic capital to other fields is undeniable. But its most immediate effect would be to depreciate the holdings of small investors.

In operation it would be singularly complicated.

Clause 23, referred to above, clothes the Minister with discretionary powers so absolute as to give him entire liberty to free any person or persons from payment of the tax. This is not only unsound, but unsafe.

Part II. of the bill deals with natural gas. It imposes a tax (amount yet unspecified) on every thousand feet flowing, drawn or pumped or produced by a well.

"A meter," it continues, "shall be affixed . . . to every pipe or duct at or near the mouth of every well," for the purpose of measuring and recording the total gross quantity of gas produced by the well.

It will be noticed that a distinction is made here. The tax on gas is on the gross quantity produced and not upon profits.

Incidentally it may be remarked that the affixing of meters to all pipes or ducts is either a physical impossibility or a matter implying a largely disproportionate expense.

It is, perhaps, pertinent to observe that in drafting legislation of this kind competent specialists should be consulted.

Could local interests and all questions of expediency be relegated to oblivion, we are confident that but few thinking men would dispute the necessity and adequacy of a properly adjusted acreage tax. The subject is a large and complicated one. Expediency must in most human affairs play a large part. But we are approaching a parting of the ways, when principles must be considered. Therefore it behooves us as citizens of a great country to squarely and fairly meet the questions of to-day and to settle them to the permanent good of that country and not to the temporary gain of party or persons.

The method, at present in vogue in Canada, of stimulating industry by subsidizing production is open to attack on sound economic grounds. We believe that the whole principle of the Government bonus on output is fundamentally unsound. In the case of the Canadian mineral oil industry we have, for example, an illustration of the inadequacy and disadvantages of the bounty as compared with the more straightforward and economically sounder protection duty.

Formerly Canadian oil was protected by a duty of \$1.75 per barrel. At the solicitation of the American

Trust, the Standard Oil Company, this duty was removed. In support of this step it was argued that Canadian production was not equal to the domestic demand. And the presumption was that the Canadian consumer would benefit by the free admittance of oil from the United States. Meanwhile, to compensate the operators of oil wells in Canada, the Government agreed to pay a bounty of fifty-two and a half cents per barrel on production.

As a consequence of all this the Canadian consumer pays exactly the same price for his oil as he did before.

The Canadian producer is getting \$1.14 per barrel at the well in the Tillbury field, instead of \$2.12, the average price per barrel in 1904, the year before the duty was removed. The American trust pockets the difference. Moreover, we are now supplied with American oil to the detriment of the new Canadian oil fields; which, together with the older sources, are quite capable of fully supplying the home market.

From other points of view the bounty system is open to objection.

One strong count against it is that it discourages the investment of capital in industries which, from the fact that they are subsidized by Government, are looked upon as unstable.

The very name "bounty" is unfortunate. Our mining industries require not the fortuitous and inadequate help of a bonus; but assistance of a very different nature.

A complete and well rounded system of education provides for the development of *all* the possibilities and powers which may be latent in us. It is incomplete and one-sided if it neglects or overlooks any of them. Judged from this standpoint, our educational facilities in Canada are far from complete. General education is fairly well provided for in our common schools, high schools and universities, but we have hardly done more than make a fair beginning in that kind which bears directly upon industries, viz., technical education. Now that we have entered upon a period of rapid growth, we should study carefully all the measures which may be taken to insure this growth shall be healthy, steady and permanent. We must work at our own problems in our own way. We may get good ideas by studying what has been done in other countries farther advanced in manufactures and other productive industries, but it would not be wise to transplant their systems to our soil. It is better to begin with existing institutions and develop them. We have here and there agricultural colleges, mining schools, dairy schools, and schools of engineering, but we have no technical schools devoted to textile, ceramic, metal-working, chemical, and other great industries. Technical education, pure and simple, is the function of such schools. In the modern world they are just as necessary to the effective development of the nation as are the common schools, the high schools, and the universities. All are necessary. We cannot afford to neglect or ignore any means of promoting clear thinking, keen research, and skilful production. We are becoming alive to this fact, and some of our societies, including the Canadian Manufacturers' Association, the Canadian Mining Institute, and the Society of Chemical Industry, have taken steps to bring the subject before the public and before the Legislatures. This is the right direction. We cannot afford to wait for the chance beneficence of individuals. There is one good idea we can import from Germany. There,



where universities, high schools and trade schools work together in their influence upon industries, they are sustained by the central Government, by the kingdoms, grand-duchies, etc., and by the municipalities. While the Act of Confederation leaves educational matters to the Canadian Provinces, there is nothing in it to prevent the Dominion Government from granting subsidies to provinces and municipalities for technical education. Such assistance will be necessary, as the revenues of the provinces are very limited, while that of the Dominion grows rapidly with the expansion of the country. Agriculture, mining, transportation and manufactures are national. This is recognized in the constitution of the Dominion Departments and their branches. Here is a chance for some of the Ministers to do a piece of work which will keep their memories as green as that of Colbert in France.

Our larger cities might make a beginning by converting one of their high schools into a technical or scientific high school. This would entail large expenditures, but boards of education which go forward courageously will soon see paying results in the gathering to such centres of the highest young intellects of the Dominion. The effects of such schools upon manufactures are soon felt. As the great German chemist, Ostwald, recently declared, the most valuable kind of energy in a country is mental energy, and the more brains we succeed in putting into our goods the greater is their value. The kind of education we are pleading for is that which will teach us to combine more mental energy with the rough primal material. In the last analysis, the greatest factor in a country's prosperity is the intelligence of its people. Not many years ago there was practically no foreign market for Canadian butter and cheese. Professor Robertson, Dr. Saunders, Dr. Mills and their colleagues showed the dairymen how to combine more mental energy with their products and now the markets of the world are open to us on favorable terms. The Masseys, Cossitts, Deerings, etc., have so combined mental energy with our iron and wood that Canadian agricultural implements are sold as far as the antipodes. But we have only made a beginning. Governments, Dominion and Provincial, municipalities, and men of wealth who love their country, must look into this subject in the light of the enormous extent to which scientific training is being utilized in modern industries. We are in the engineering age. The rule of thumb days are gone. We cannot afford any longer to be without such a system of technical education as shall touch every industry and be within the reach of every Canadian youth.

The Summary Report of the Geological Survey of Canada, which receives more extended notice in another column, breathes a spirit of progress and of judiciously tempered aggressiveness.

The desirability of employing undergraduates of the Technical Colleges as summer assistants is strongly urged. It is also urged that their remuneration be ample enough to prove an inducement to the best men. This is not only right but necessary.

The Director also points out that the value of the mineral production of Canada has increased by leaps and bounds, until it now amounts to seven times what it was twenty years ago. No corresponding increase is

to be observed in the appropriations of the Government for the work of the Geological Survey.

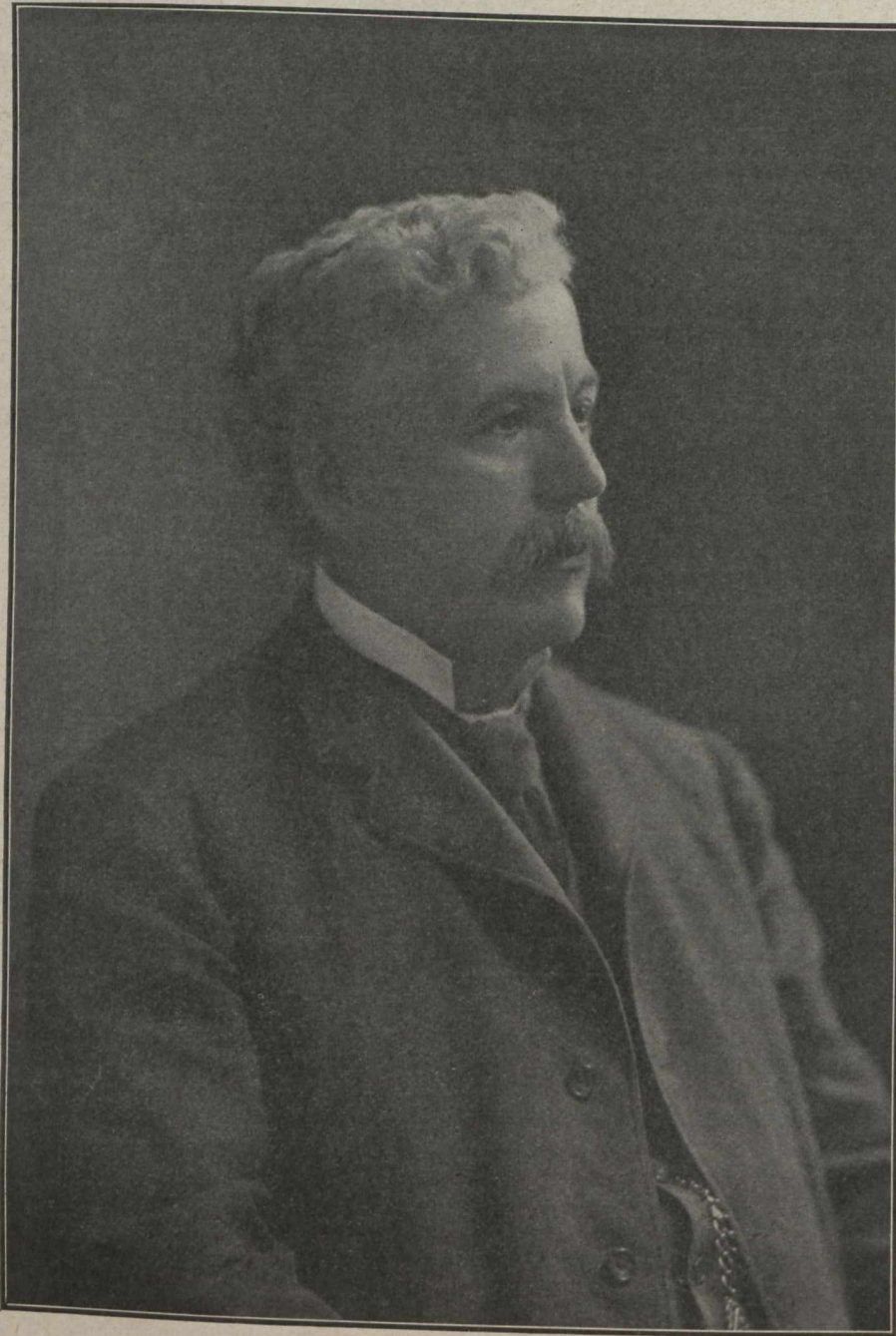
The annual meeting of the Canadian Mining Institute, which is to be held in Toronto on March 6th, 7th and 8th next, promises to be of exceptional importance and interest. A very large attendance is anticipated of men representative of Canadian mining and allied industries, while, too, we understand, the Institute will have the privilege of entertaining as its guests a number of eminent American scientists and engineers, including President Van Hise, of Madison University, Prof. Leith, Prof. Kemp, and Mr. John Hammond. The programme, which we publish elsewhere in this issue, includes a list of upwards of fifty papers, many of which are on subjects of special significance and interest at the present time. Thus, to mention a few, Prof. Van Hise's paper on the "Geology of the Cobalt Area; Mr. Hiram W. Hixon's contribution on the "Smelting of Cobalt Ores," being an expression of opinion from an undoubted authority on metallurgical matters—suggesting a solution of a difficult problem—and Prof. Leith's paper on the "Iron Ores of Canada," are extraordinarily opportune and of great practical value. The Institute is prosecuting a most useful work and it is satisfactory to learn that its scope and influence is steadily increasing.

In a recent issue of *The Mining Journal* (London), Mr. Edward Ashmead, F.C.A. contributes an interesting article on mining companies' registration in Great Britain during 1906. Compared with the remarkable record established in Ontario last year, in this respect, Mr. Ashmead's statement showing a registration of three hundred and eighty-six new mining issues, with an aggregate nominal capitalization of £29,829,435 fades into comparative insignificance. This, nevertheless, is a gain over registration returns for the corresponding periods of the preceding two years, due, in large measure, to a revival of interest in British metal mining. Foreign promotions were fairly evenly distributed, South Africa heading the list with fifty-seven companies, which, however, were for the greater part reconstructions or re-organizations of existing undertakings. Rhodesia, meanwhile, appears to be gaining in favour, and the gold returns from there last year were over 150,000 ounces greater than in 1905. Copper mines, however, have been in great request, and Mr. Ashmead states that good copper properties offered in any part of the world were readily taken up. In this list Canada makes a rather poor showing with but eleven registrations, three of which were Nova Scotian undertakings and two British Columbian. The Cobalt excitement has yet to extend to the old world, as apparently but one concern preparing to operate in this new territory was registered in London in 1906.

Dr. Robert Bell, F.R.S., Chief Geologist of the Canadian Geological Survey, has been awarded the Cullom medal for the year 1906. This is a timely recognition of Dr. Bell's long and honorable service.

We learn, with great regret, that Mr. A. P. Low, Director of the Geological Survey, is critically ill at his home in Ottawa. Although strong hopes are entertained for his recovery, it will nevertheless be several months before he will be able to resume his official duties.





THE HON. MR. TEMPLEMAN

The Hon. Mr. Templeman (who, upon the creation of a Federal Department of Mines, will be appointed Minister of this important Department), was born at Pakenham, Ont., of Scottish parents, in 1844. He has been engaged the greater part of his life in the business of publisher.

About forty years ago he established the *Almonte Gazette*, which is still in existence and enjoys a considerable circulation. In 1884 he removed to Victoria, B. C., where he established, in association with other gentlemen, the *Times*, one of the most important dailies of the

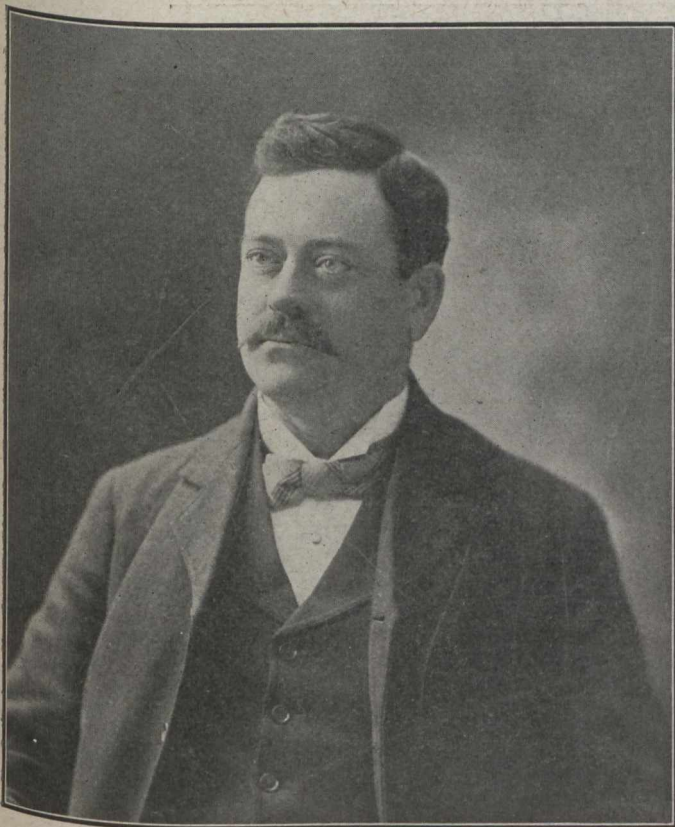
Pacific coast. Mr. Templeman, who had already taken an active interest in politics, became a Senator in 1897, and entered Sir Wilfrid Laurier's Administration without portfolio in 1902. Early in 1906 he was made Minister of Inland Revenue, after resigning his seat in the Senate and being returned for Victoria by a large majority. During the summer of last year the Geological Survey, which had formerly been under the jurisdiction of the Department of the Interior, was placed under Mr. Templeman's charge. Our photograph is by Savanah, of Victoria.



## INDUSTRIAL PIONEERS OF CANADA

John James Drummond, born in Ireland, 1856, family removed to Canada while he was still quite young. He was educated in Montreal. Having a strong bent for mechanics, he determined to make it his life-work, and, after a thorough training in some of the best Canadian shops, he removed to the United States in the early eighties, and gained there a wide experience in blast furnace practice. Returning, in 1889, he joined his brothers and other associates in the newly formed Canada Iron Furnace Company, Limited, and designed and built the present Radnor furnace, reorganized and systematized the manner of securing the bog and lake iron ores of the district, and modernized the methods then in vogue in respect to the supply of wood and manufacture of charcoal.

Under his personal superintendency the enterprise was most successful, the product of the Radnor furnace



JOHN JAMES DRUMMOND

proving of such high quality that the brand "C. I. F." became famous, not only in Canada, but in the United States, Great Britain, France, Belgium, Austria, and indeed in Russia, to all of which countries "C. I. F." iron was regularly exported until the Canadian trade became so large as to absorb the entire output of the furnace, which was necessarily restricted in point of tonnage on account of the natural difficulties in the way of securing each year more than a certain tonnage of the bog and lake ores of the district.

In 1899 the directors of the Canada Iron Furnace Company, Limited, determined to undertake the manufacture of foundry iron, with coke as a fuel. The port of Midland, Ont., was decided upon as a site for the new enterprise, and Mr. J. J. Drummond was entrusted with the establishment of same. He designed the entire plant,

together with a system of docks that have no equal on the upper lakes. The whole work of construction was carried out under his personal direction, and by December, 1900, the first Midland furnace was blown in, the then Premier of Ontario, Hon. Mr. Geo. W. Ross, with a large number of leading Canadians, being present at the official opening.

The Radnor and Midland works were the first modern furnace plants ever designed and erected by a Canadian. Since then Mr. Drummond has rebuilt and reorganized the Londonderry works, and all three plants are still under his management, with a fourth furnace contemplated for erection at Midland or other point in Ontario.

Mr. Drummond possesses that rare combination of a sanguine temperament with tenacity of purpose. His clear vision of the larger national issues, his faculty of inspiring his subordinates with affection and loyalty, and his tremendous capacity for work have enabled him to surmount difficulties which would have easily discouraged a lesser man.

Men of his type are Canada's best product.

## MINES AND MINING AT COBALT

BY WILLET G. MILLER.

A year has now passed since the publication by the Bureau of Mines of the second edition of the writer's report on the "Cobalt-Nickel Arsenides and Silver Deposits of Temiskaming." I am now requested by the editor of *The Canadian Mining Journal* to prepare an article on this mining camp for the first number of *The Journal*. It is, however, difficult for me to add anything of scientific interest to what was contained in my report. I have there given as fully as was deemed desirable the history of the discovery of the camp, together with an account of the geology and of the veins and their contained ores. Although during the last year much work has been done in the camp, little has been added to our knowledge of the character and modes of occurrence of the ores and of the geology in general of the field.

An account of the stock-jobbing operations which have been connected with the camp during the past year would simply be a repetition of what has taken place in many fields during the last fifty years or more, illustrating man's cupidity, together with the absurd credulity and ignorance, which the many have in connection with mining matters. Cobalt has offered the best field for the stock-jobber in mines that the world has probably ever seen. It is within a comparatively easy distance of the great centres of population in Eastern North America. A Pullman car can be taken to within a few hundred yards of some of the richest mines, and the massive silver and other minerals to be seen in numerous veins are of the character to serve the purpose of the promoter. It is doubtful if the losses will not be greater through the prices at which the stock in some good properties has been sold than by what is invested in the real "wild cats." Over a year ago, by means of interviews in the press and in his report, the writer felt it his duty to warn the public concerning the period of stock-jobbing and mining on paper that he saw ahead. He felt, however, at the time that this would do little good. It seems that the public must have its period of gambling in mines every seven years or so, a period about like those in which occur epidemics that sweep off certain groups of wild animals in our northern regions. It is doubtful whether one should sympathize much with the ordinary purchaser of mining stocks. He does not buy stocks as



a permanent investment, but with the object of keeping it for a rise in price and selling it to some other fellow before the crash comes. He is then more inclined to buy stocks controlled by men whom he knows to be successful boomsters than to seek the advice of someone with a sound knowledge of the mineral industry. Such being the case the chief injury that the genuine mining man feels the industry suffers from a boom is that after its collapse it is difficult to raise capital for the development of good properties. There might be mentioned another element in connection with the Cobalt field which has assisted the boomster. This is owing to the fact that the geical structure of the field is somewhat unique and difficult to understand by one who has not made a careful study of it. Hence the opinions of men whose reputations have been made in other camps are often of little value in connection with the ore bodies at Cobalt.

the older properties during the past year, and some promising veins have been found on the borders of the producing area, notably in the eastern part of Coleman township and to the northward.

#### Revised Map.

During the last half of the year a party under my direction has been engaged on the detailed mapping of the more productive part of the area. This map, which will be published during the coming spring, has been plotted to a horizontal scale of 400 feet to the inch, and with ten feet contours. It covers an area about fourteen square miles in extent. In an east and west direction it extends approximately from Clear Lake to the western boundary of the township of Lorrain. Its northern boundary is the southern edge of the township of Bucke, while to the south it is bounded by a line running east



GILLIES LIMIT EXPLORATION. GOVERNMENT CAMP, DIABASE POINT, GIROUX LAKE

#### Characteristics of the Veins.

The most striking feature of the camp is the occurrence of numerous narrow veins, probably averaging less than four inches in width, and the great richness of these veins, unique in their mineral contents, in so far as is known in North America, in that they carry high percentages of cobalt, nickel and arsenic, associated with silver in the native state and in lesser amounts in compounds. The number of workable veins so far discovered is difficult to estimate, but it can be put at approximately one hundred. Others will be found, especially on the older producing properties. The method of prospecting for these veins is somewhat unique, consisting of digging trenches in a more or less systematic way through the soil where the rock is not exposed. The surface of the bed rock being uneven, the thickness of the soil varies greatly, and the depth of the trenches is from a few inches to fifteen feet or more. Many miles of trenches have been dug in the district, and within certain areas the work can be carried on with the certainty of discovering veins before a large part of a mining location has been examined.

A considerable number of veins has been discovered on

and west through the northern part of the Gillies timber limit. The productive veins, or those likely to be productive known at the time our work was done, are plotted to scale. While this map gives, of course, a more accurate knowledge of the boundaries of the exposure of the various series of rocks—Keewatin, Huronian and diabase—our work on it has not changed our views concerning the origin and relationship of the members of the series.

The map, which was published from our work in 1904, of which 16,000 copies have been used by those interested in the field, has served its purpose. When the field work on it was begun in 1904, the area which is now the township of Coleman was literally a *terra incognita* so far as maps were concerned. We had not only to map the lakes and streams and to show as far as practicable the distribution of the rocks, but we had also to determine the relationship of the rocks as well. In addition to this we had, of course, to study and describe the rare and unique group of minerals, so far as North America is concerned, found in the veins. Comparatively little prospecting was done in 1904, and the map was ready for the first prospectors who entered the field in 1905. If we had had either more funds at our disposal or more time for the



work, we could have prepared a more perfect map, but our desire was to have the map ready for the prospector, instead of waiting and publishing what may be called a *post-mortem* sheet, such as has been the case in most mining fields. Owing to the removal of the trees over much of the area and to the fact that much work has been done in the way of stripping the surface, we are now able to determine the boundaries of the various formations with greater accuracy.

#### *Structure of the Area.*

Although the geology of the area is probably known to most of our readers, it may be well to summarize it for the purpose of this article. The oldest series of rocks in the district of which we have any knowledge is what is called the Keewatin. This essentially a complex igneous, volcanic, series, consisting essentially of greenstone and other basic rocks, associated with which in

This period of subsidence, during which gravel and other fragmental material were deposited, is known as the Huronian. It undoubtedly represents a great length of time.

As stated in the writer's report, some of the coarser bouldery material in the Huronian has the appearance of a glacial deposit, giving the impression that glaciers may have been active for a time during the far distant Huronian period. There are some points in connection with these coarse fragmental series which are, however, difficult to reconcile with a glacial origin of the material. We know, for instance, that some, at least, of this material has originated in place and represents the weathered surface of the Keewatin and Laurentian on which it is deposited. Moreover, there is no unconformity, in so far as the writer knows, between the underlying slaty graywacke and feldspathic quartzite series and the overlying conglomerate, such as would occur if the



GILLIES LIMIT. GOVERNMENT GEOLOGICAL PARTY

minor amount sare granite, porphyry and acidie types. The Keewatin is called a complex series, because it is made up of rocks which not only differ in their chemical and physical characteristics, but which also represent different periods of eruption, these eruptions having probably taken place throughout a great interval of time. The term Keewatin is simply an age name, which is applied to this interval of time.

At the close of the Keewatin age, and after the igneous rocks belonging to it had been disturbed and altered, there took place a great intrusion of granite, which cut through the Keewatin series. To this granite, which is extensively developed in the township of Lorrain, the name Laurentian, another age name, is given.

After the eruption of the granite the surface of the earth in this part of the continent was subjected to a prolonged period of erosion or wearing down action. Valleys in some parts of the area were cut deep into the surface, producing a landscape more rugged than that of the present day. Then there was a gradual subsidence beneath the waters, and the valleys became filled with gravel, sands and clays, more or less impure, which finally formed a mantle deep enough probably to cover the hill tops.

conglomerate were of glacial origin. Striations on boulders in the conglomerate may be produced either by the slight movements which can be seen to have taken place in the rocks or probably by the change in volume of the boulders through the serpentinization of chloritization of their surfaces.

The term agglomerate, meaning fragmental material ejected from a volcano, is a misnomer when applied to these Huronian conglomerates.

After the deposition of the Huronian boulders, gravel and sand, and after these had become hardened to conglomerate, greywacke slates and impure quartzites respectively, another eruption of igneous material took place which invaded all the older series—Keewatin, Laurentian and Huronian. Much of this diabase spread horizontally through the other series, from east to west, across about the eastern half of what is now the more important part of the productive mineral area. In some parts of this area, which has been worn down several hundred feet or more since the diabase eruption, masses of Keewatin are in places found overlying the diabase. Along the western face of the main mass of the diabase shown on our map, east of Peterson Lake, the Huronian series can be seen to dip gently under the diabase. On



its western edge the diabase is now only a foot or so in thickness at some points. At Diabase Mount and at the Devil's Rock it can be seen to be at least 300 or 400 feet thick. Originally the diabase probably had a mushroom-like form, spreading out horizontally between the older rocks, which have now to a large extent been worn away from above.

*Formation of Veins.*

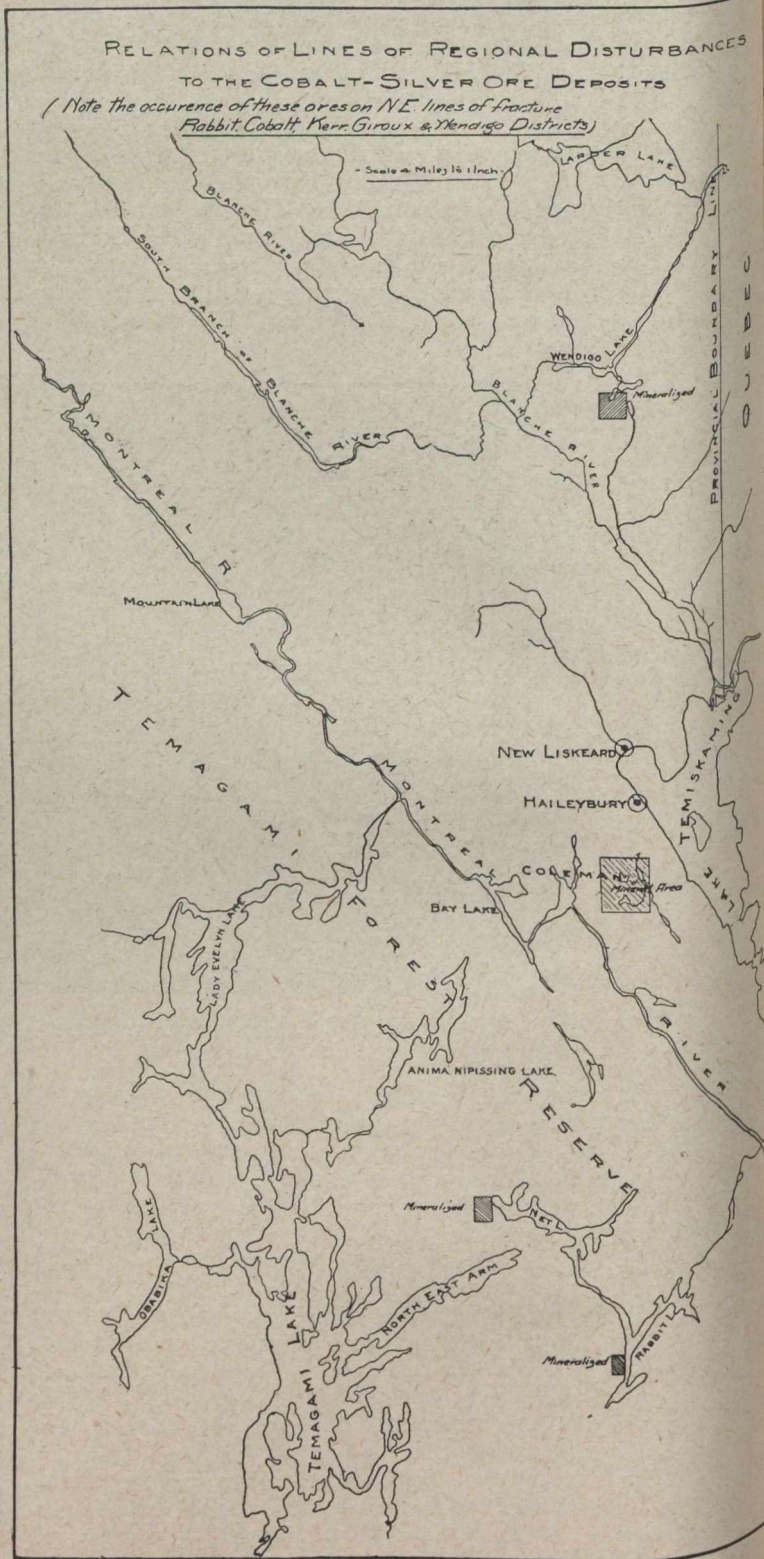
The veins, which are being worked chiefly for their silver content, but which also carry values in cobalt, nickel and arsenic, appear to have been formed at the period when the cooling of the diabase was taking place. On cooling the diabase would contract, producing fissures, not only in its own mass, but also in the rocks with which it was in contact or which lay adjacent to it. Some fissures may, of course, have been formed at the time of the eruption of the diabase, but there is nothing to prove that any of those of economic importance were produced by this disturbance. At points where it is possible to make observations, it is found that the metal-bearing veins pass downwards from rocks intruded by the diabase into the diabase itself. This shows that the fissures in the diabase are contemporaneous with those of the surrounding rocks.

The Huronian rocks, being more readily fractured than either the diabase or the Keewatin, it is natural that the greater number of the veins are found in them. Many of the veins in the Huronian occupy openings which have the appearance of being ordinary joint cracks, as if these rocks during gradual settling of the area after the diabase eruption had been affected by jointing. The Keewatin, on the other hand, at a distance from the diabase, has not as yet proved to contain veins of economic importance, and some veins carrying good values in the Huronian have been found to be practically barren, especially of silver, when the underlying Keewatin is reached. In the eastern part of the more productive area, where the Keewatin comes in contact with the diabase, and where masses of it rest on the diabase, a few good veins have been found on it. The Keewatin, under these conditions, while being very tough as compared with the easily jointing Huronian, could not fail to be fissured, floating as it does at times on the diabase.

*Origin of the Ores.*

It seems pretty clear that the ores of silver, nickel, cobalt and arsenic were deposited from solution in the heated, impure water which followed the diabase eruption, representing the end product of the volcanic action. As to the source of the various metals, i.e., as to whether they were carried up from great depths by the heated waters, or whether they were wholly or partly leached from the rocks through which the waters passed, it is impossible to give a definite answer. The metallic silver now contained in the veins existed originally, in all probability, in the compound form. The cobalt-nickel ores were deposited in the cracks and fissures at an earlier period than the silver. Some fissures were completely filled with the cobalt-nickel ores and their associated gangue material, chiefly calcite, at this early period. Afterwards there was a slight movement probably due to the gradual settling or contraction of the area owing to the continued cooling of the diabase or from some other cause. This slight movement disturbed many of the veins already filled, producing cracks and openings

in them, through which percolated the silver-bearing solutions. Some of the cobalt-nickel veins, however, even in the Huronian, escaped this disturbance. Hence we find that they do not contain silver in economic quantities. The question has been asked, why, if a vein



passes from the Huronian into the underlying Keewatin, it should, if it carries silver in the former formation, not contain it in the latter. The answer to this seems to be that, while the disturbance after the deposition of the cobalt-nickel ores was sufficient to affect the Huron-



ian rocks, it was not, in many cases, of great enough magnitude to disturb the veins in the tougher and more massive underlying Keewatin. It may be added that while some strong veins in the Huronian continue into the Keewatin, others end abruptly when the Keewatin is reached. At times strong veins in the Huronian are succeeded in the Keewatin by several branching cracks and fissures.

*Extent of Territory.*

While the area in which the veins rich in silver are found is only about six square miles in extent in the township of Coleman, with two or three locations in the township of Bucke, the area over which ores of Cobalt have been found is much larger. Cobalt ores have been shown to occur at various points about 30 miles north of Cobalt station, and they have been found in small quantities about the same distance to the southward. To the westward these ores have been found in the western part of Coleman, near Portage Bay, and also in the Temagami Forest Reserve, 25 or 30 miles from Cobalt. In the writer's report attention was drawn to the striking regularity of the great water courses of the district, especially those running from northwest to southeast. It was also shown that there is a less striking system of lakes and streams which follow northeast-southwest lines. These lines probably represent faults or folds, and can be called in a general way lines of weakness. The accompanying diagraph shows the relationship of some of the more important of these lines. The occurrence of the cobalt ores seems to be connected with the northeast-southwest lines. It will be noticed that the Cobalt area proper is on one of them. Then the discoveries of cobalt which have been made near Wendigo Lake are along another line, consisting of a chain of eleven small lakes. In the vicinity of Rabbit Lake, to the southward, where a little cobalt has been found, we have another similar line.

*Production.*

The following table shows the production of the camp in 1905. Statistics for 1906 are not yet complete, but it can be said that the output of silver was worth approximately \$3,509,000. Much of this ore was taken from the cuts and from shafts and drifts during the progress of the development work. Little stoping has been done on some of the most important properties.

	Quantity.	Value.
Tons of ore shipped .....	2,144	.....
Silver, ounces .....	2,441,421	\$1,355,306
Cobalt, tons .....	118	100,000
Nickel, tons .....	75	10,525
Arsenic, tons .....	549	2,693

The silver contents of the ore in 1905 averaged 1,138.72 ounces per ton of ore.

*Refining.*

Up to the present time there has been a loss of nearly 25 per cent. of the value of the average grade of ore shipped, owing to the lack of proper refining methods. During last year practically nothing was received for the cobalt, nickel and arsenic contents of the ore, although the percentages of the substances average about 6, 3 and 30 respectively.

Some of the ore has been partially treated at Sudbury, but the greater part of it has been shipped to the vicinity of New York.

Plants for the treatment of the ores are now in course of erection at North Bay and Sturgeon Falls, and associations of the mine owners are arranging for the treatment of the ores at Deloro, in Hastings county, and in the Niagara peninsula.

*Revenue From the District.*

While many individuals have made fortunes in the district, eight or ten Canadians having become millionaires, the revenue derived by the Government has also been important. The mining rights to Cobalt Lake were sold by tender for \$1,085,000, and those of Kerr Lake for \$186,500. In addition to this, 25 per cent. of the gross value of the ore at the pit's mouth is received from one mine, and the Railway Commission, representing the Government, receive svarying percentages on the railway right of way, and on the town site of Cobalt. The development of the district has been of great benefit to the Government railway, the Temiskaming & Northern, and to the agricultural district to the north.

At the last session of the Legislature an appropriation was voted for the exploration of the Gillies timber limit, the mineral rights of which had been retained by the Crown. During the past few months a party, under the writer's direction, has been engaged in preparing a geological map of the northern part of the limit, and in searching for veins, several of which have been discovered. The most important of these was discovered on July 19th while trenching through a thickness of four or five feet of soil. A shaft was then sunk in the rock outside of the vein to a depth of 75 feet. A cross-cut was made to the vein, and at the present time a drife has been made along the vein for a distance of 150 feet, showing ore of a high grade. This vein having been developed directly by the Government, represents a unique mine in North America, the first and only one worked directly, it is believed, by a Government.

ONTARIO MINING LEGISLATION

Owing to the recent discovery of minerals in the Cobalt district and the great development of that part of the Province, the Government of Ontario introduced, at its last session, an Act relating to mines and minerals, known as "The Mines Act, 1906." This Act supercedes the former Mines Act, and prospectors should have knowledge of those parts of the Act which direct the manner in which title may be acquired to mining properties.

It would be impossible in an article such as this to discuss the Act in detail, but the writer will endeavor, in as small space as possible, to give some information to intending prospectors and others interested in mining who have not hitherto become familiar with the requirements of the law.

The first thing a prospector must do if he intends to discover and explore mining properties, is to take out what is known as a miner's license. This license can be procured from the Minister, Deputy Minister, or any mining recorder by any person over the age of eighteen years upon payment of a certain fee. The fee for a license for an individual is \$10, unless the license is procured on or after the 1st September, 1906, and prior to the 1st April, 1907, when the fee is \$5. The fee for a license for a partnership or incorporated company varies according to the number of members of the partnership, and the authorized capital of the company. All licenses



expire at midnight of the 31st day of March after their issue, but are renewable. As noticed above, any person over eighteen years of age may procure a license. It is also provided that, although a licensee may be under the age of twenty-one years (which, generally speaking, is the age at which persons can by contract create legal liability) he shall, as regards his mining property and liabilities contracted in connection therewith, be deemed to be of full age.

When a person has procured his license he is in a position to prospect for minerals, either on his own behalf or on behalf of any other license on Crown lands and on lands, the ores and minerals whereof have been reserved by the Crown, except lands which are staked out and occupied as a mining claim or are under working permit, or are withdrawn from exploration by any Act or order-in-Council. (Prospectors in the Forest Reserves must have an additional permit to be allowed in such reserve.) If he makes a discovery of valuable mineral he must then "stake out" his claim. A mining claim and area comprised in a working permit in unsurveyed territory must be laid out with boundary lines running north and south and east and west, and must not exceed a square of twenty chains containing forty acres; but an irregular portion of land lying between two or more claims may be staked out with boundaries coterminous with the boundaries of adjoining claims, provided such irregular claim does not exceed forty acres. In townships which have been surveyed into sections of 640 acres or 320 acres, a mining claim must not exceed forty acres, and in townships which have been surveyed into sections of 200 and 100 acres, a mining claim must not exceed fifty acres. In order to "stake out" a mining claim the licensee must plant a discovery post of wood or iron upon an outcropping or showing of mineral; upon this post must appear the name of the licensee making the discovery. If the discovery is made on behalf of a licensee other than the discoverer, the name of such other licensee and the number of his license must also appear on the post. A post must then be planted at each of the four corners of the claim in the following order: Post No. 1 at the northeast corner, No. 2 at the southeast corner, No. 3 at the southwest corner, and No. 4 at the northwest corner. The number in each case to be on the side of the post which follows it. The particulars required to appear on the discovery post must also appear on No. 1 post, and if the claim is in a township surveyed into lots the sub-division or part of the lot intended to be comprised in the claim must also appear. If there are standing trees upon a mining claim the licensee must blaze the trees on two sides only, and cut the underbrush along the boundary line of the claim, and also blaze a line from No. 1 post to discovery post and mark on No. 1 post the distance to the discovery post. If there are no standing trees he shall indicate the outlines of a claim and also a line from No. 1 post to discovery post by planting pickets, not less than five feet in height, at intervals of not more than two chains, or by erecting at the same intervals monuments of earth and rock not less than two feet in diameter at the base and at least two feet high. No more than three claims may be staked out and recorded by a licensee in any mining division during the period covered by a license year.

When the licensee has staked out his mining claim he must, within fifteen days thereafter (except where the claim is more than ten miles from the office of the recorder, when an additional day is allowed for each additional 10 miles), furnish to the mining recorder a plan of the claim showing the posts and the distances

from each other in feet, together with an application giving the name of the licensee interested and the number of his license, the name (if any) of the claim, and its locality, as indicated by some general description, so that the recorder can lay down the claim on his office maps. If the claim is in a surveyed township the portion of the lot intended to be comprised in the claim must also be given. If the outlines of the claim are not regular the length of such outlines shall be given, and also the cause of their not being regular, and the situation of the discovery post by distance and direction from No. 1 post. The application must also state the time of the discovery, when the claim was staked, and the date of the application. Both the plan and application must be verified by oath. In addition to the foregoing requirements, the discovering licensee must make an affidavit showing the discovery of valuable mineral and that "the deponent has no knowledge and has never heard of any adverse claim by reason of prior discovery or otherwise." The affidavit must also state the locality of the claim; as indicated by some general description or statement. This affidavit has caused considerable difficulty. Suppose the licensee applying has heard of a prior claim which he knows to be invalid, can he say that he has never heard of any adverse claim? It seems clear that he cannot truthfully do so. If this is so, is it sufficient for him to swear that he never heard of any adverse claim except (mentioning the claim of which he has heard)? Is the recorder bound to accept an affidavit in this form? Such an affidavit was presented to the recorder, who refused to file the application. The matter then came before Mr. Justice Anglin, who held that the affidavit might contain exceptions, and ordered the recorder to accept the affidavit and file the application. This decision has been appealed from to a Divisional Court, but the appeal has not, at the date of writing, been argued.

A point to be remembered is that if the mining claim is filed against land, the surface rights of which are owned by a settler, the applicant cannot get a certificate of record until he has settled with such surface owner as to compensation for damages to the surface. If he and the owner are unable to agree, the Mining Commissioner has power to settle the amount. After this is done, and after sixty days have elapsed from recording of the claim, if no dispute as to the right of the applicant has been recorded, and if the claim is passed by the inspector, the applicant may procure a certificate of record of his mining claim. When the certificate of record is granted, it shall, in the absence of fraud on the part of the licensee, be final and conclusive evidence of the performance of all requirements of the Act, except working conditions, and in the absence of fraud the claim shall not be subject to forfeiture, except for non-compliance with working conditions.

After a licensee has procured his certificate of record he must do certain work upon his claim. During the three months succeeding the recording of the claim he must carry on mining operations to the extent of not less than eight hours per day for thirty days. During each of the two years following the expiration of the three months he must do similar work to the extent of not less than eight hours per day for sixty days; and during the third year he must do similar work to the extent of not less than eight hours per day for ninety days. This work may be performed in a less period if the licensee desires. The licensee must make a report, verified by oath, to the mining recorder, showing that the working conditions have been complied with. He



may then get a certificate from the recorder to that effect, and if he applies within three months from the expiration of three years and three months from the recording of the claim, then upon payment of the purchase price he is entitled to his patent, which gives him a title to the property which is not subject to forfeiture. Special provisions are in the Act, allowing the work to be done on one of several adjacent claims owned by one person.

If a licensee desires to obtain exclusive possession of an area of mining lands, not exceeding forty acres in extent, open for exploration with a view to discovering minerals, he may procure what is known as a working permit upon complying with certain conditions. He must first stake out the boundaries by planting a post at each of the four corners. These posts are to follow in the same order as in the case of a mining claim. If one or more of the corners of the claim fall where the nature of the ground renders the planting of posts impracticable, as, for example, if one of the corners is under water, such corner or corners may be indicated by planting at the nearest suitable point a "witness post," which shall contain the same marks as corner posts, together with the letters "W. P." and an indication of the bearing and distance of the site of the true corner from such witness post. The licensee shall write on No. 1 his name, and, if he is staking on behalf of some other licensee, he must also give the name of such other licensee and the number of the license of such licensee and the date of the planting of the posts. He must then, if there are standing trees, blaze the trees upon two sides, and cut the underbrush along the area where there are standing trees. The outlines of the area may be marked in the same manner as in the case of a mining claim, except that pickets or monuments of earth or rock may be at intervals of four chains instead of two, as required in the case of a mining claim. The licensee must write upon No. 1 post "working permit applied for," and must make three rings or notches, not less than a quarter of an inch deep and not less than two inches apart, beginning at a distance of not less than two nor more than three inches from the top. The licensee shall also make a trench not less than six inches deep for a distance of not less than six feet, beginning at No. 1 and running along the boundary line between No. 1 and No. 2, and also a trench of the same depth and length along the boundary between No. 1 and No. 4. If the area is in a surveyed territory the licensee must indicate on No. 1 post the portion of the lot upon which the area is situated. The area must not exceed forty acres in a mining division, or twenty acres in a special mining division. The applicant must then furnish to the recorder an application in duplicate, indicating the location of the area by reference to some ascertained boundary or locality, and he must furnish to the recorder within fifteen days proof of the planting of the posts and their distances from each other, together with an application in writing with proof under oath of the name of the licensee interested and the number of his license; such general description as will enable the recorder to lay down the area on his office maps, the time when the posts were planted and the area staked out, and evidences on oath "that the land at the time of its being staked out was not in occupation or possession of or being prospected by any other licensee, and that the deponent has no knowledge and never heard of any adverse claim by reason of prior discovery or otherwise."

It will be noticed that this affidavit is very similar to the one required to be made when applying for a min-

ing claim, and the question has arisen, may the affidavit state that the deponent has never heard of any adverse claim except (mentioning a claim which he thinks not to be a *bona fide* claim)? The Mining Commissioner has held that there can be no exception mentioned in this affidavit, and that if the applicant cannot make the affidavit without any exception he cannot get a working permit. This decision, however, has been appealed against, and is now awaiting the judgment of the Divisional Court.

After the licensee has filed his application he must procure from the recorder a certificate of his application and affix it within three days after it is granted to No. 1 post, unless the area is more than 10 miles from the recorder's office, when an additional day is allowed for each 10 miles. After sixty days, and within seventy days from the staking out of the area, the licensee must apply for a working permit from the mining recorder. A working permit will not be granted where the surface rights have been sold until the licensee has arranged compensation with the owner, in the same manner as an applicant for a mining claim. An application for a working permit gives no right to exclusive possession until the permit has been granted. The licensee, after procuring his working permit, must search for minerals to the extent of not less than eight hours per day for five days in each week, during the six months next following two weeks from the issuance of the permit. Once it is granted the holder of a working permit has a title such as the practical miner wants, absolute possession, so long as he works the property, convertible into a patent as soon as his work results in a discovery which will pass inspection. If that cannot be obtained in three years the miner is as well off without a patent. The Act provides that all discoveries are subject to inspection by the inspector, but the writer will not deal with this branch of the Act at the present time. All papers prior to patents are filed in the offices of the recorders of the respective divisions and many details must be observed, as to most of which the recorder can furnish information. Once the application for patent is made, the papers go to Toronto, the land fees are paid there, and the patent when issued carries the land under the Land Tables Act, and it is governed by the ordinary land laws, save that to carry on the business of mining, by person or corporation, the annual license must still be taken out.

#### THE UNDEVELOPED MINERAL RESOURCES OF CANADA

At a recent meeting of the McGill Mining Society, Dr. Frank D. Adams, Logan Professor of Geology at this University, delivered an interesting address on the subject of the undeveloped mineral resources of the Dominion. The speaker, in his introductory remarks, stated that the public generally failed to grasp the relative importance to Canada of the mineral industry. In the last twenty years the mineral output had increased from a valuation of the million dollars per annum to approximately seventy million dollars, and in view of enormous mineralized territory as yet unworked, it might not be too much to expect that Canada in due course would become the greatest mineral producing area of the world. "Now," the lecturer proceeded, "it becomes a matter of interest to inquire whether this output, which has increased so extremely in the past twenty years, will continue to do so. If we may depend on geological science, the reply is in the affirmative. From



the Researches of the Geological Survey we now know, approximately, the extent of our mineralized areas and the localities in which minerals will probably be discovered."

Referring first to coal, the lecturer pointed out that coal occurred in this country both in the carboniferous and cretaceous formations, the coal fields of the Maritime Provinces occurring in the former, while those west of the Rocky Mountains belonged to the cretaceous period.

Although the area of trap rock in Nova Scotia is comparatively small when compared with New Brunswick, the coal seams here are much thicker and constitute the most important of the Eastern coal areas.

While no recent estimate has been made of the probable extent of this field, the Sydney field alone was known to contain at least one thousand million tons of coal, and this represented a very small section of the undeveloped coal resources of Cape Breton.

In New Brunswick there is a great distribution of the carboniferous system, but the coal fields are thin; in most cases only twenty to fifty feet below the surface. It is, nevertheless, estimated that this area contains about one hundred and fifty millions of tons of coal at present undeveloped.

Again, all along the southern side of the Baie of Chaleurs are undeveloped coal fields, dipping into the sea and flooring the whole Baie, and these areas will doubtless in time be worked.

The most easterly development of coal in the western system is in the Souris River district, in Manitoba, where lignitic coals are mined. The quality of the product improves as one proceeds westward, and good anthracite is found in the Rocky Mountains. Dr. George Dawson has estimated that in the district of Lethbridge there are about five and a half million tons of coal under each square mile; in the district of Blackfoot about nine million tons under each square mile; and at Medicine Hat about four million tons under each square mile. Hence, in this section of the country we have coal in great quantities, near the surface and easily worked.

Again, in the great Crow's Nest Pass coal area, according to an estimate made by Mr. James McEvoy, there are in the vicinity of twenty-two thousand five hundred and ninety-five million tons of available coal. Further north, near Banff, are extensive fields of anthracite; while beyond are the coal areas of the Peace River and of the districts between Clearwater and Red Deer River, where recently was found twenty-four seams with an aggregate of ninety-five feet of workable coal, as well as other discoveries of value. Along the proposed route of the Grand Trunk Pacific coal fields have been discovered, and when this line is completed it should result in the development of new and important areas.

The gold production of Canada has recently shown a decrease, largely on account of the exhaustion of the rich Klondike placers. But gold is found in nearly all the Provinces of the Dominion. Nova Scotia for many years has produced largely, but while the quartz is rich, the veins are narrow and somewhat expensive to work.

There are also indications of possible gold discoveries in New Brunswick. In the Eastern Townships alluvial gold has been found in the Chaudiere valley, but the section has not as yet proved regularly productive. Then on all the streams running into the St. Lawrence to the north, in the Laurentian country, gold exists, though heretofore it has not been found in payable quantities. A gold property on the Riviere du Loup en Nant, how-

ever, was worked for about a year, and yielded sufficiently well to pay expenses. So that in this area we have a gold field which at some future time may possibly be worked to advantage.

Again, there are the gold fields in the Hastings district of Ontario. The gold here is associated with a great intrusion of granite, where we often find mineral deposits. The veins here are rich, though pockety. In the Rainy River country some forty or fifty mines were operated at one time.

Crossing the plains fine gold is found in the lands of the Saskatchewan river; and with adequate equipment these lands might be made to yield a considerable amount of gold. In British Columbia we have great gold fields; and, too, in the Yukon. In the Klondike section the cream of the gold fields has been skimmed, but all through this country there are great auriferous deposits, which with the aid of capital should prove very profitable to work. Quite recently, however, valuable deposits have been found by a member of the Geological Survey. In the Lake Bennett district quartz reefs have been discovered from two to fourteen inches wide and traceable for long distances. These veins contain not only native gold, but gold in association with tellurium, and have already yielded results up to five thousand dollars per ton. Hence we are gradually extending our mineral producing areas.

In British Columbia, which is after all but a continuation of the California mountain system, there is every reason to anticipate the discovery of new rich alluvial deposits; and the geological conditions are such that we may expect that country, when fully explored, to prove a second California in point of mineral richness.

Canada, as is well known, is the greatest nickel producing country in the world. In 1905 the Sudbury mines produced upwards of seven and a half million dollars worth of nickel. These valuable deposits occur in the Huronian, the great mineral-bearing rocks of North America. The mines were first worked for copper, but the ore proving very refractory to smelt led to the discovery that it contained nearly as large a percentage of nickel.

In addition to the properties now being worked, there are a number of mines in the district which have been partially developed, but from which production is not being made, the operative properties supplying fully the present market demands. Then nickel has also been found to the south, outside this area, and still other discoveries will undoubtedly be made, as we have the same geological conditions in different localities. These nickel deposits are sufficiently extensive to supply the world's requirements in this metal for many generations, and the industry, as we have seen, is capable of great expansion.

Passing next to copper, we find from statistics that Canada produced last year over seven and a half million dollars in this metal. What was remarked of nickel in Ontario applies equally to copper, and all through the Huronian belt we find valuable deposits of copper and nickel. In the Temagami district rich discoveries have also been made, and throughout the area the indications are most promising. British Columbia, however, is the great copper producing Province of the Dominion. To this output Rossland is a considerable contributor, though its record is eclipsed by the Boundary District, where are found enormous deposits of low grade ores, which can not become exhausted for many years to come. Farther west, the Geological Survey has reported the



occurrence of considerable deposits of copper, which should prove very valuable when developed; while on Texada Island and the Mainland coast important copper mines are being developed. It may, in short, be said that the copper resources of the Dominion are only now beginning to be exploited.

Until recently the greater proportion of the silver mined in Canada was derived from the galena deposits of the Slocan and East Kootenay districts of British Columbia. But some two years ago the phenomenally rich Cobalt silver area was discovered in Northern Ontario, in the same area as the copper, from which, in 1906, a production of something like six million dollars was made. All the leads have been confined to a limited area in this Huronian belt, and there is no reason why equally rich mineral deposits should not be found in the same formation northward.

On the south shore of Lake Superior we find there are belts of Huronian rocks extending into Michigan and Minnesota. These contain immense deposits of iron, and the greatest deposits of iron in the world are just south of Lake Superior. Unfortunately, so far as has been ascertained, the values in these iron ranges decrease when they extend into Canada. But in Michipicoten we have a great iron range, in which have been developed the Helen and other iron mines, and throughout the Huronian rocks low grade ore occurs in considerable quantity. In particular, large deposits have been found in the Temagami district. In the north, in Labrador, extensive deposits of iron have been reported by Mr. A. P. Low, of the Geological Survey, while south of Georgian Bay iron also occurs. In the west, iron of good quality has been found in East Kootenay, while there are extensive occurrences on Texada Island and on the west coast of Vancouver Island, which in due course may be conducive to the establishment of an important industry.

The great demand that has arisen for concrete, for building and other purposes, perhaps justifies a word in reference to the resources of the Dominion in this respect. It may, in fact, be said that in almost every Province we have excellent limestone in unlimited quantity, from which to manufacture cement, and already a cement industry is being established in Canada, which is bound to grow to considerable proportions.

After referring to the possibility of the discovery of diamonds in the Temagami and iron districts in the Huronian belts, the lecturer concluded his remarks by reiterating his belief that Canada has not only great supplies and reserves in coal and mineral, but vast resources as yet undeveloped.

## CASSIAR AND THE BERRY CREEK MINE

BY CLIVE PHILLIPS-WOOLEY

There are some countries which spring at once into notoriety, and are successes from the finding of the first "float" like Cobalt, and there are others which have their preliminary flutters, their subsequent period of comparative neglect, and their ultimate revivals, or second births, like Cariboo.

In spite of some disappointments in the past those who know him believe that "Hobson of Bullion," now that he is to have a free hand and all the money he wants, will make Cariboo the biggest thing yet in hydraulic mining.

The writer doubted of this once himself, but five years of practical experience in hydraulic mining (on a

smaller scale it is true) has taught him the necessity of big outlay to achieve success in a big thing.

Cassiar belongs to the same class as Cariboo, which it resembles a good deal in character and history. Between them they make up the northern half of our great Province, and the gold we find in both is found on ancient river channels, probably belonging to the pre-glacial era.

Like Cariboo, Cassiar had its early rush of "cream skimmers," poor but energetic individual miners, who fought their way into the country in spite of all difficulties of transportation, found gold, and dealt with the richest and most obvious deposits of it successfully, and when they had exhausted the very richest spots which alone could pay under such circumstances as they had to contend with, abandoned the country until the era of companies, hydraulic mining and Guggenheims should arrive.

In Cassiar in 1873, Thibert and McCullough and others, located claims upon Dease Creek, Thibert Creek and McDames, and from these the pioneers and a few thousand of similar character took, with the rudest appliances, some \$4,500,000 worth of gold dust; at least the Government collected upon that amount, though how much more was won must be a matter of conjecture.

In those early days, men went by steamer to Wrangel from Victoria; thence by canoe or over the ice up the Stickine for 150 miles, thence they had to pack over a forest trail for 72 miles, boat across Dease Lake and climb in from there to the various creeks upon which their claims lay.

If you will compute how much in the way of grub, blankets and tools, you could transport for yourself over such a route (if you were man enough to get over it at all) and then multiply that amount by three to make allowance for the difference between a western hard-fist and the ordinary man, you will be able to judge of the length of time these men could stay to mine in each season.

The whole of a normal season to-day is only 150 days, but luckily it is not difficult to mine for the whole 24 hours of each day, and the difficulties of frozen ground, big boulders and cement are for the most part absent.

Under such conditions it is not wonderful that the first excitement soon subsided, and by the early eighties the country about the Stickine settled down to its primeval silence. This was the period of the white hunters who wandered about the great river and the lands between Telegraph Creek and the Liard, taking toll of the big game which to-day attracts such a number of sportsmen from the different centres of wealth and civilization.

Then once more the cry was "gold," this time in the Klondike, and British Columbia had the chance of its life, and missed it, because the Senate of the day was afraid that Messrs. Mann and Mackenzie might make too good a thing out of their grant of snow and ice in return for an all-Canadian route, which would have given to our coast towns the trade which has built Seattle. The Senate probably saved Messrs. Mann and Mackenzie some initial disappointment, and set back Victoria half a century, since such trades as that of the Yukon are not offered even in the West more than twice in a hundred years.

About this time various smaller companies sprang into existence, the Cassiar Central Railway Company, which preceded Mann and Mackenzie, and also ended in disaster; the Casca Trading & Transportation Company, which went out of business without a debt and without



a nickel, setting a good example perhaps of business morality and affording an example of the unwisdom of trying to rival the old Hundson Bay Company—and some others.

Eventually, when everyone had lost all the money he had to lose, some of the members of these companies got hold of a piece of property on lease upon Thibert Creek and settled down to learn mining. Their adventures would furnish material for a Bailantyne for life, and what they don't know about the difficulties of transportation and the charms of opening a vast hydraulic property without working capital (assisted fortunately by contributions from the sluice boxes), is scarcely worth consideration.

But luck (you can spell it differently if you please) and the sure knowledge acquired by extensive preliminary tests, that the gold was there, pulled them through, and to-day the Berry Creek Hydraulic Mining Company has probably a better record than most mining properties in British Columbia.

Originally it consisted of seven leases, worked by two No. 2 and two No. 4 giants, and from 400 to 600 miners' inches of water. All that nature could do for us except as to transportation had been done. No one need want a better dump, and in the other essentials of hydraulic mining we were fortunate, but we had our business to learn, and every experiment we made showed us that our deposit was larger than we had ever dreamed, and richer, in that, in addition to the coarse gold for which we were mining, we had a good deal of fine gold and a very considerably quantity of osmiridium, of the value of which we had at first no knowledge. All this had been going into the dump. To-day the property consists of ten leases of eight hundred acres each in one continuous body, fronting Thibert Creek for 15,000 feet, the deposit varying in width from 300 to 600 feet, and in height from 50 to 200 feet or more. Our manager in 1905 put the average width at 350 feet and the height at 125 feet, giving an estimated gravel deposit of about 30,000,000 cubic yards, of which not more than 450,000 cubic yards had been washed by the company, and perhaps 100,000 by former miners, of whom one gang took out \$80,000 from a piece of ground which the present company could handle in a month.

To-day the mine is being worked by No. 6 giants and 1,000 inches of water, the continuation of which, throughout the season, has been assured, but to work the mine from the best possible business basis, even this should be doubled, as it could be if the necessary money were forthcoming. It is obvious that if the gold in such a deposit could be taken out in three years instead of in sixty, with the same fixed charges, Government fees, manager's and other salaries, the saving in cash in the long run would be enormous.

The net result of the mining operations then, to date may be summed up very briefly. We have at last made, opened and equipped our mine thoroughly up to the standard referred to, and in the intervals of the labor of opening and equipping, have managed to do 150 days of actual washing for gold, although a very great deal even of that time we have been washing the least remunerative top gravel, but in those 150 days we have taken out \$63,000 of gold dust, and 150 days is just one normal season.

Towards the end of this season, when we were at last running with our new monitors and our 1,000 inches of water, we were taking out an average of \$475 per diem, and just as the mine had to be closed down for the year struck a rich patch which makes us anxious for the

commencement of next season. In the words of the managing director, "a thorough clean-up was made in the boxes and cut in No. 2 pit; the bed rock in the cut was picked, and all gold that could possibly be collected, saved. The water supplied by the new ditches had been turned off for the winter, and we only had the small amount brought down by Berry Creek with which to finish the cleaning up in the lower pits.

"To avoid letting any of this water run to waste, we ran again in No. 2 pit for ten hours with a poor head. On walking through the cut after this run I noticed a good showing of gold on the bed rock. Snow fell during the night, and the next day the water was turned off for good, the machinery was dismantled and the year's work was over.

On weighing the gold from the last clean-up, we found that one roasting of amalgam was just a quarter of an ounce short of 500 ounces, and I volunteered to get a quarter of an ounce out of No. 2 cut. I went up with our foreman, but found the snow so deep in the cut that I could not pick up the gold I had seen over night. A stream of muddy water was trickling down out of the pit, and to get any gold at all, we had to lift this water in V-shaped troughs and then scrape the gravel into a pan and save it by hand-washing. In this manner we took out of one small hole, towards the head of the cut, twelve pans of gravel, which yielded \$130 in coarse dust and small nuggets.

"When it is remembered that it takes sixty pans of dirt to make a cubic yard, these figures are phenomenal, and while I am far from wishing to raise any exaggerated hopes that may not be fulfilled, the results obtained establish without doubt the fact that we are at present mining extremely rich ground."

With adequate knowledge of hydraulic mining, a rare asset nowadays, and ample money for development and working expenses, we might no doubt have done much better.

Had we prospected the pockets of the public and handsomely advertised our property we might have done better still, but as an example of what may be taken out of the gravel itself by hard work and such persistent energy as has been displayed, for instance, by our managing director (who is also our head piper), Mr. Warburton Pike, this is perhaps not bad.

Besides the Berry Creek Company there are two other hydraulic mining companies in Cassiar, but these are still in their initial stages, and when the day comes for dealing with lode mines, *i.e.*, when Cassiar has some transportation facilities, it will be found that the pioneers of the country have their stakes upon some rock which would not be sneered at in any mining camp.

It will be observed that in this article no allusion has been made to the Atlin country, which is, of course, a portion of Cassiar. This is a wilful omission. Atlin is sufficiently well known to the public and is rapidly making itself a good reputation. It has the start in the race. It will do well, if it leads or is in sight of the Stickeen country at the finish. Good luck to both of them.

## WESTERN COAL RESOURCES

By J. C. GWILLIM

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Prior to 1902 the country west of Fort William was supplied with coal from the following sources:—

Winnipeg, and Manitoba generally, from the Eastern Staes, by way of the Great Lakes to Fort William, and



thence by rail to Winnipeg and the Manitoba towns. Besides this, some of the Souris-Estevan lignite was used for local steam and fuel purposes. The Souris field lies about 280 miles southwest of Winnipeg.

Up to this time practically no coal came into Manitoba from the Alberta or British Columbia mines, partly because the costs were against it. Probably Alberta coal can be laid down at a slightly lower price than Eastern coal in Winnipeg, but the quality is hardly as good as the best Eastern coal. In 1904 farmers in Western Manitoba paid \$17 per ton for Eastern hard coal. Semi-anthracite from Bankhead, in Alberta, could now be sold at these points for under \$12.

In the Territories the sources of supply were the Canmore and Anthracite mines of Bow Valley, on the main line of the Canadian Pacific Railway, and the Lethbridge and Frank mines on the Crow's Nest Pass Railway.

None of these were heavy producers, their total daily output being under 1,000 tons. The demand for domestic fuel was light and was supplied from Anthracite and Lethbridge. The former mine shipped a semi-anthracite coal as far as the San Francisco market, while Lethbridge lignite found favor as a stove coal in the Territories and in Southern British Columbia.

For the British Columbia interior and some of the Western States the Crow's Nest collieries supplied a good steam bituminous coal, and a superior coke for smelting purposes.

On the coast, Vancouver Island collieries, at Nanaimo, Wellington and Comox, supplied the coast trade and shipped largely to San Francisco.

Up to this time the collieries were easily supplying a very inadequate demand.

Since the year 1902 there has been a rapid increase of settlement and of values throughout the Western country. The demands for steam transportation, domestic fuel and smelter coke have all increased greatly. This increase has caused the opening up of several new collieries in Alberta, chief of which are Taber, Bankhead, West Canadian Collieries, and the International Coal & Coke Company, all of these, except Bankhead, being upon the Crow's Nest Pass line.

None of this coal west of Red River is of the carboniferous period, such as furnishes Eastern America and much of Europe. All the Western coal is cretaceous or later; but owing to conditions of heat and pressure which accompanied the formation of the mountains, it is quite largely bituminous and in a few places semi-anthracite. Wherever the coal is later than the cretaceous period, or is far removed from the mountains, it is a lignite of more or less value, according to the amount of alteration since its deposition. Age, alone, does not determine its quality.

Passing westwards from Winnipeg, the different fields may be summarized as follows:—

*Souris-Estevan Field.*—Two hundred and eighty miles southwest of Winnipeg, in rocks later than the cretaceous and similar to those of the Edmonton field, 800 miles west of Winnipeg.

This coal, a lignite at a short depth below the general prairie level, is of only moderate value for fuel and locomotive work. On exposure it crumbles badly, but owing to its position it may hold the local trade against the long haul of Eastern and Western coals. If it can be commercially briquetted it may find a large market.

*Taber and Lethbridge Fields.*—Seven hundred miles west of Winnipeg. These are cretaceous lignites of good quality, firm and blocky; this coal burns well in stoves,

and is used for locomotives during certain seasons. At Lethbridge this coal lies about 200 feet below the prairie level and is mined on only one four to six foot seam, which dips gently westwards.

West of these fields and overlying them is a later formation, which also carries lignite seams. These occur in a strip which runs from the United States boundary up to and past Edmonton. At the latter place they furnish a fair quality of domestic and steam coal for local purposes.

*The Mountain Coal Fields.*—These seams and strata have been thrown up from their deep-seated position in the lower cretaceous by the eastward thrust of the Mountain ranges. This movement by folding and faulting the coal measures along a N. N. West line within and in front of the first mountain ranges, has caused a number of repetitions of the same coal measures.

It is this repetition and the ease of access by tunneling that make the Alberta bituminous coal a favorable source of supply for the great needs of our own Prairie Provinces and the States to the southeastwards which lack good coal.

This belt of lower cretaceous coals tapers off to a few narrow basins within the mountains as one goes northwards to Yellow Head Pass. It has been traced for about 300 miles in a N. N. West direction from the United States boundary; beyond that point there is an absence of these measures for a space, but this reappears on Pine and Peace River, 300 miles further on in the same direction.

Wherever the folding has been most intense this coal is apt to be badly crushed, but its grade passes from bituminous coking coal upwards through semi-bituminous steam coal to a semi-anthracite, such as that found at Bankhead, near Banff, the head of the south fork of Sheep Creek, and, it is said, some areas in the Crow's Nest field.

*Crow's Nest Field* and its extensions up the Elk and Fording Rivers 40 to 70 miles north of Michel are fields of great magnitude in area and total thickness of seams. This coal is especially fitted for the coke so necessary in the smelting operations of the mountain mineral districts.

There is no coal field, in quantity and quality, on the Pacific slope which is likely to rival this region. The States of Idaho, Washington, Oregon and California have little coal of this quality, and it may supply many of the Western smelters as well as some of the Pacific steam service besides the main part of the interior mountain traffic.

Some grades of it furnish fair domestic fuel; north of these Elk River fields the bituminous coal does not appear on the Pacific slope of the first mountain ranges, but is confined to a few narrow strips along the Alberta or Eastern slopes and inter-mountain.

*The Interior British Columbia Fields.*—These are confined to smaller areas of lignite and low bituminous coal, of which Nicola coal field is the best example in quality. They are of a period later than the cretaceous, are more irregular, and, unless affected by later igneous intrusions, are apt to be lignites of no great value for coking or steam coal. However, they will furnish local transportation and fuel purposes on account of their position from Crow's Nest or Vancouver Island.

*Pacific Coast Coals.*—These are cretaceous coals of fair steam quality. They occur on Vancouver Island, Queen Charlotte Islands and on the mainland within the drainage basin of the Skeena River. The Vancouver Island coals are mined at Nanaimo, Wellington, Union



and Comox. On the eastern shore they occur as a narrow strip outcropping along the shore and dip gently beneath sea water to the east. The coal here has been estimated to be of great amount, but much of this ground will not furnish the tonnage expected of it. The seams are not numerous nor of great thickness. They also have unworkable areas, but, being as they are on tide water, and having no greater competitors upon the North Pacific coast, will be made to yield to a large market. North of Vancouver Island there are some uncertain areas of bituminous and anthracite coal on Queen Charlotte Islands, which have not yet been extensively worked.

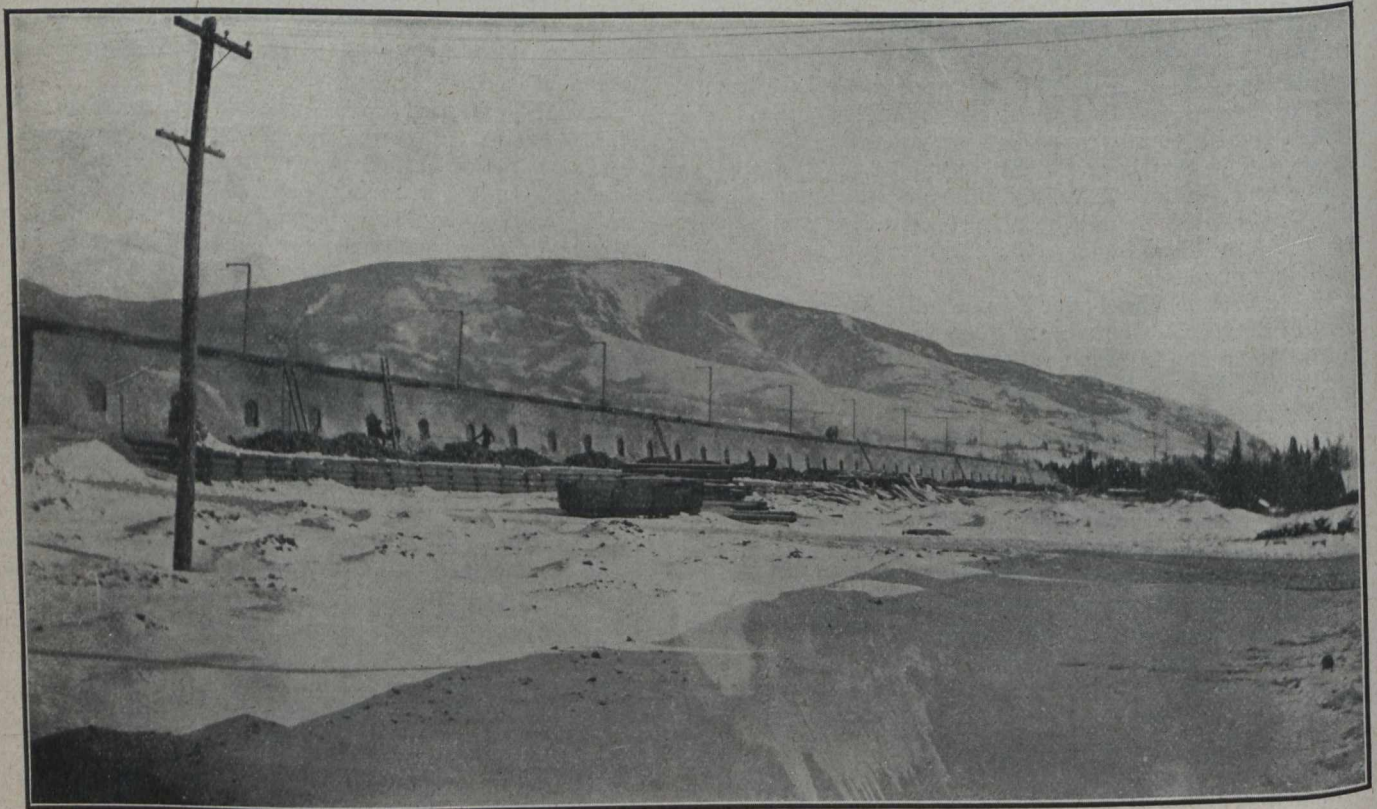
To the east of Queen Charlotte Sound, and within the influence of the Pacific terminus of the Grand Trunk Pacific, there are some areas of bituminous and anthracite coal. These have been prospected and located within late years, more especially within the drainage

## THE INTERNATIONAL COAL AND COKE COMPANY, LIMITED

DENISON COLLIERY, COLEMAN, ALBERTA

Among the newer mines being opened up in Alberta is that of The International Coal & Coke Company, Limited, at Coleman, on the Crow's Nest branch of the Canadian Pacific Railway. Although Coleman is only a little over three years old, and the mine has been on a shipping basis for about two years, both have made that progress and development which characterize Western enterprise.

The plant has a capacity of 2,000 tons daily, and is handling at the present time 1,500 tons. No expense has been spared by the company in making the equipment thoroughly up-to-date in every particular, and it



BEE HIVE COKE OVENS—INTERNATIONAL COAL & COKE CO., COLEMAN, ALBERTA

of Telkwa Siver, in anticipation of the trade of the new Pacific terminus and its railway. They were the subject of an investigation by Mr. W. W. Leach, of the Canadian Geological Survey last summer, and an account of them may be found in the Annual Summary Report for 1906. Between these Pacific fields and Peace River or Yellow Head Pass there is unlikely to be good steam coal; and again between these and Fort William there is little chance of bituminous coal.

Thus the Great Lakes; the first or eastern foothills and ranges of the mountains, and the Pacific coast will be the chief coal distributing points of the future for Western Canada.

To those who are interested in the Western coal resources, there is a fund of information in the reports of the Canadian Geological Survey, especially those made by the late Dr. G. M. Dawson, D. B. Dowling, Jas. McEvoy and W. W. Leach.

may be safely said that the International has one of the most modern plants in the West.

The measures occur in the cretaceous or laramie cretaceous coal-bearing rocks, and are part of the great Crow's Nest field, but, separated from the Crow's Nest Pass field proper by the main range of the Rockies, the height of land coming about eight miles west of Coleman. Two seams are being worked from the drainage level, No. 2 for steam coal, and No. 4 for coke. The dip is very regular in both seams; at from 30 degrees to 32 degrees, and the system of mining used is room and pillar, the sooms being run straight up the pitch, with a sheet iron chute in the centre.

In No. 2, cross-cuts every 60 feet, and rooms 50-foot centres and 10 feet wide, make the pillars 60 feet by 40 feet; a barrier pillar double this size divides a panel of 10 pillars from the next 10; and every tenth room is run to the surface as an air shaft, thus providing the



required split in the air, also a means of lowering timber into the mine as the work advances.

No. 2 is a 14-foot seam, with good roof and bottom, and the pitch is sufficient on the sheet iron chute to carry the coal to the gangway by gravity.

The haulage, which has been found to work very satisfactorily, is by compressed air locomotives, three of which are used, two 5 inch x 10 inch cylinders to collect the trips in the mine, and one 6 inch by 10 inch cylinder to haul the loads to the tippie.

No. 4, or the coking seam, is 6 feet thick, and worked on the same system as No. 2, except that the rooms are 60-foot centres and 15 feet wide, making the pillars 60 feet by 45 feet.

All mining is done by hand, and while the mine cannot be said to be gaseous, safeties are used in all the working faces.

An 11 foot by 6 foot Cappell fan, running at 200 revo-

sure to the various charging stations on the surface and in the mine.

The power plant is all under one roof and most modern and efficient in all details.

The Cappell fan mentioned previously has a capacity of 150,000 cubic feet per minute, driven by a 150 horsepower Westinghouse motor, and can be used either as an exhaust or a blower by the manipulation of a system of doors in the fan house.

The machine shop equipment is electrically driven, and consists of one 30-inch American Tool Company's patent engine lathe, one 24-inch drill press, one 16-inch by 24-inch shaping machine, one bolt threading machine, one 24-inch swing saw, one 18-inch combination table saw, sheet steel shears, rollers and punch.

The blacksmith forges and carpenter shop are under the same roof as the machine shop, making a most convenient arrangement.



lutions per minute, and supplying 130,000 cubic feet of air per minute at 1.4 water gauge, is used with excellent results.

All power used in and around the mine is generated at a central station, which is equipped with four 100 horse-power Erie City return tubular boilers, and two 150 horse-power Jenkes return tubular boilers, all at a pressure of 110 pounds.

Two 400 horse-power Phoenix engines, direct connected with two 250 kilowatt 250 volt direct current Westinghouse dynamos, supply electrical power for the fan, machine shop, tippie, and lorries, and also for the town and mine electric light systems.

The compressor for the air haulage system is a 4-stage Canadian Rand machine, high pressure duplex 16-inch by 24-inch steam cylinders, with Myers' riding cut-off valves. The air is delivered at 1,000 pounds pres-

The coal is hoisted from the yard level to the tippie floor on two automatic self-dumping cages, working in balance.

No. 2 coal passes over a bar screen to a link belt picking table, and from there to the storage bins directly under the end of the picking table.

The No. 4, or coking coal, passes from the tippie floor into a 9-foot Bradford breaker and reduced to half inch and smaller before going to the slack bins.

An Ottumwa Box Car Loader handles the coal from the storage bins, which have a capacity of 2,000 tons for lump, and 1,000 tons for slack.

The slack from the Bradford Breaker is conveyed by two electric lorries (of 6 tons capacity each, and equipped with 35 horse-power Westinghouse motors) to the coke ovens, of which there are at present 176, of the beehive type, 12 feet by 7 feet 5 inches, with a capacity on hour coke of 300 tons per day.



The product of the mine is used to a large extent by Western railroads, both in Canada and the States, the supply falling considerably short of the demand.

The coking plant is also taxed by the ever-increasing demand from British Columbia smelters, and the coal mining industry generally, while yet in its infancy as compared with the Eastern fields, bids fair to rival Pennsylvania and Nova Scotia in a very few years.

## RECENT DEVELOPMENTS IN METALLURGY

By S. F. KIRKPATRICK

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In the following paper I do not intend to give an exhaustive resume of the various improvements in the art or science of metallurgy, but rather to show by a few examples what great advances have been and are being made in that direction.

The statistics of the production of the principal metals in the last few decades is instructive, showing that in the last forty years, from 1865 to 1905, the yearly output of gold has increased threefold. In the same time the annual production of silver has increased 4.7 times, the production of copper 7.7 times, the production of lead 5 times, the production of zinc 6.2 times, the production of pig iron 6 times, and two new metals which were not formerly produced on the commercial scale are sold to-day in large quantities, namely, nickel and aluminium. So the consumption of metals generally in 1905 was approximately six times as great as in 1865, and it might be well to note that the yearly increase was never so great as it is at present.

Now, how is it that the supply has been able to keep up with this ever-increasing demand of the manufacturing and commercial world?

Firstly, no doubt, by the opening up of the mineral wealth of new countries and the increased transportation facilities which puts formerly inaccessible ore deposits within reach of a market and also in many cases by the settlement of new districts bringing the market to the ores.

Besides this, however, there is another important force; in the increased engineering and metallurgical skill brought to bear on the mining and treatment of the ores, so decreasing the cost of recovering the metals that lower grade and more refractory ores can be treated at a profit. The metallurgical treatment of the various ores is sometimes the development of years or centuries; and so-called standard methods of treatment have been devised. But there is always a gradual improvement in the details of the manipulation, the result of the combined energies of all the metallurgists in charge, so that in the course of time from a crude evolves an efficient process. This change is slow but steady, for engineers are generally conservative, and if a process or machine works satisfactorily they will not discard it for an untried device, even if that device gives promise of very considerable advantages.

So it does not follow, because a particular process or furnace is the standard type, that it is the best device that could be employed. Possibly if another process or type of furnace had been first introduced it would have succeeded better. Sometimes we find the same class of ore treated by entirely different methods in different countries, and it may be some time before one of the processes is developed to such a point that it can show itself so superior to the other as to replace it.

Besides this gradual advancement there is occasionally a radical change made in the method of treatment. This may be due to the work of some one man who will conceive an idea and work out and prove his views until, with the help of a commercial plant, he will convince the most conservative metallurgist of the value of the process.

In many cases, however, this radical change of method will be forced by some external cause, such as a change in the grade or character of the ore treated, or a decrease in the market value of the metal produced, so making the standard method formerly employed no longer profitable. Then it is that the metallurgists compete to overcome the difficulty and nowhere could the old adage, "Necessity is the Mother of Invention," be more true; for a new method is nearly always found. For the metallurgists are only working on the threshold of a science, the possibilities and limitations of which it is hard to state.

Take the case of smelting of iron ores for making pig iron crude cast iron. The first blast furnaces were introduced in Germany and England about the 14th century. The same general process is used to-day; but the early smelters would have considered half a ton a good day's output with a consumption of two to four tons of charcoal per ton of iron, while last year one of the large Pittsburg furnaces made 900 tons of pig in 24 hours, probably using only three-quarters of a ton of coke per ton of iron.

This great change can not be attributed to any one time or man, but rather to the gradual evolution marked by some few decided advances, such as the introduction of coke in place of charcoal in the seventeenth century, the introduction of the hot blast in 1828 by Neilson, and later the construction of the furnace with a closed top, so saving the waste gases that contain a large percentage of carbon monoxide; and this inflammable gas is used to heat the blast and supply all necessary power used around the plant.

The development in the smelting of copper ores in the last few years is quite marked. Twenty-five years ago small furnaces of brick were used that would treat from 30 to 100 tons of copper ore per day; and it was considered that an ore should assay from six to eight per cent. copper to be a good financial proposition.

These small furnaces worked slowly and somewhat erratically, requiring constant repairs and were very subject to the worst disease of a furnace, namely, a freeze-up.

Before the scientific days of copper smelting, when many of the furnaces were in the hands of the so-called practical metallurgist, who had rather a contempt for chemistry, this was considered unavoidable and the following story was much appreciated by the copper fraternity. A boastful metallurgist when visiting a large copper smelter remarked to the foreman in charge that he had never had one of his furnaces freeze up. The foreman looked at him for a minute or two and then remarked: "Well, friend, you are either a blank liar or you hain't had much experience."

The modern furnace, although subject to accidents, is a much more perfect machine. It is usually in charge of a technical metallurgist and can be counted on for continual operation, treating from 400 to 1,200 tons of ore per day.

This improvement has been gradual, but, as in the case of the smelting of iron, occasional great strides have been made, as in the replacing of the brick furnace by one constructed of iron water jackets, the introduction



of mechanical charging devices and in general the replacing of hand labor.

Another item of importance is the decreased use of fuel, such as coke.

In the old process for treating an ore high in sulphur (30-45 per cent. sulphur), it would be first roasted to remove a large percentage of this element, then smelted in a blast furnace with fluxes and from 12 to 20 per cent. of coke to form a copper matte containing 30 to 40 per cent. copper with iron and sulphur. This matte would then be roasted to remove more sulphur, and again smelted and possibly after on more roast copper could be obtained in a reverberatory furnace with a consumption of from 20 to 40 per cent. of fuel.

Now such an ore is treated in a blast furnace directly with little or no coke, and the heat required for melting the charge is produced by the burning of the sulphur and the oxidizing of the iron, so making a 30 to 50 per cent. copper matte in the first fusion. This copper matte, while still hot, is tapped and run into a barrel-shaped vessel called a converter. Air is forced up through the molten matte and the remaining sulphur is burnt to sulphur dioxide, which passes off as a gas. The iron is oxidized, then slagged with silica, leaving the copper fairly pure. The heat generated during this reaction is sufficient to keep the copper perfectly molten, so that it can be poured into moulds.

By this method sulphur has been converted from an enemy into a friend.

The general reduction in the cost of melting allows of ores being treated to-day that formerly would have been of no value.

In some few cases the metallurgical treatment of certain ores has remained nearly stationary for years or centuries, to be suddenly disturbed by the introduction of some new revolutionary method.

Mexico, the old silver camp of the world, is now undergoing such a change.

When that country was first opened up by the Spaniards in 1557, the Patio amalgamation process was introduced for working the silver ores, and this or analogous amalgamation methods have been operated almost continuously ever since, many of the individual mines having produced from \$100,000,000 to \$500,000,000 worth of silver.

About three years ago successful attempts were made on a commercial scale to introduce the cyanide process, in which the silver is dissolved out from the ores by a dilute solution of potassium cyanide and then precipitated from this solution by zinc or deposited by a current of electricity.

Now cyanide plants are being erected as energetically as possible in many parts of that country, and we may confidently expect that in the future the cyanide process will be responsible for a large percentage of the world's silver. On account of the decreasing cost of treating ores it is possible to treat grade ores not formerly mined. This was by no means the first time that the cyanide process was employed, for the process was devised about 1886 for the treatment of gold ores, being particularly adapted to low grade ores.

A large percentage of the world's gold was and is obtained from its ore by the process of amalgamation. In but few cases does the stamp battery extract all the values, and a long-felt want was supplied when it was found that most of the gold left in the tailings or waste from the gold mill could be extracted by means of cyanide.

From the time the process was first used it has been steadily developed, till now there are few stamp mills without a cyanide plant, and it is claimed by some authorities that directly or indirectly the cyanide process is responsible for over 50 per cent. of the world's gold.

Now, turning again to the statistics of the production of the metals in the last forty years, the question arises, What about the future? Will the available ore deposits be sufficient to supply the demand?

Much speculation has been indulged in and much has been written on this subject, particularly as regards the future of iron and fuel coal.

No doubt the output of iron must continue to increase, but at what rate we are not able to foretell. If we were to assume that the percentage of increase would be the same for the next 200 years as for the past 40, we would get some astonishing figures; but such an estimate would be entirely wrong.

Some of the iron ore deposits of the world now being mined are very large, but it is doubtful if there is 100 years' supply in sight.

But, no doubt, particularly in the new countries, many new deposits will be found of equal richness, and, moreover, there are immense quantities of rock so low in iron as not to be classed as ore at present that will, without doubt, be successfully worked by metallurgists of the future. These low grade ore bodies are even now being mined and made into high grade ore by magnetic concentration. It does not require very much foresight to say that the world need not go without iron and steel as long as there is rock containing 10 to 20 per cent. iron. Even at the present time it looks as if it would pay to treat many of the low grade iron deposits if they are favorably located. (In many cases we can mine an ore and concentrate it for less than \$1 a ton, and so we could concentrate 15 per cent. iron ore up to 65 per cent. for about \$5 per ton.) The value of iron ore at Lake Erie docks would be approximately this.

We are probably only at the beginning of the development of the world's copper fields. Particularly in the new countries. The United States is now the great producer, yielding 56.7 per cent. of the total yearly production in 1905, and will probably continue to be the most important source of supply for some years to come, particularly as active development is being undertaken in Alaska. Then Canada and Mexico and even South America are rapidly coming to the fore, and Asia and Africa have great possibilities as copper producers.

Copper, however, is not a widely distributed metal like iron, and even low grade deposits are not common.

In the last forty years there has been a greater increase in the consumption of copper than of any of the common metals.

An interesting estimate of the future production of copper based on the rate of increase in the past is given in Stevens' Copper Hand Book.

The average yearly increase during the nineteenth century was slightly over 4 per cent., and for the last decade nearly 8 per cent. At 4 per cent annual increase the production of copper in 1950 will be 3,700,000 tons, and in the year 2000 28,000,000 tons; or at 8 per cent. yearly increase the production for 1950 will be 19,900,000 tons, or, in the year 2000, 811,800,000.

These last figures are of course on entirely hypothetical data, for if the latter figures were correct nearly all the able-bodied men in the world at present would be required to produce copper. But on the most conserva-



tive estimate, the demand for copper or some metal that can take the place of copper as an electric conductor, will grow and it is an interesting speculation as to where this supply will come from.

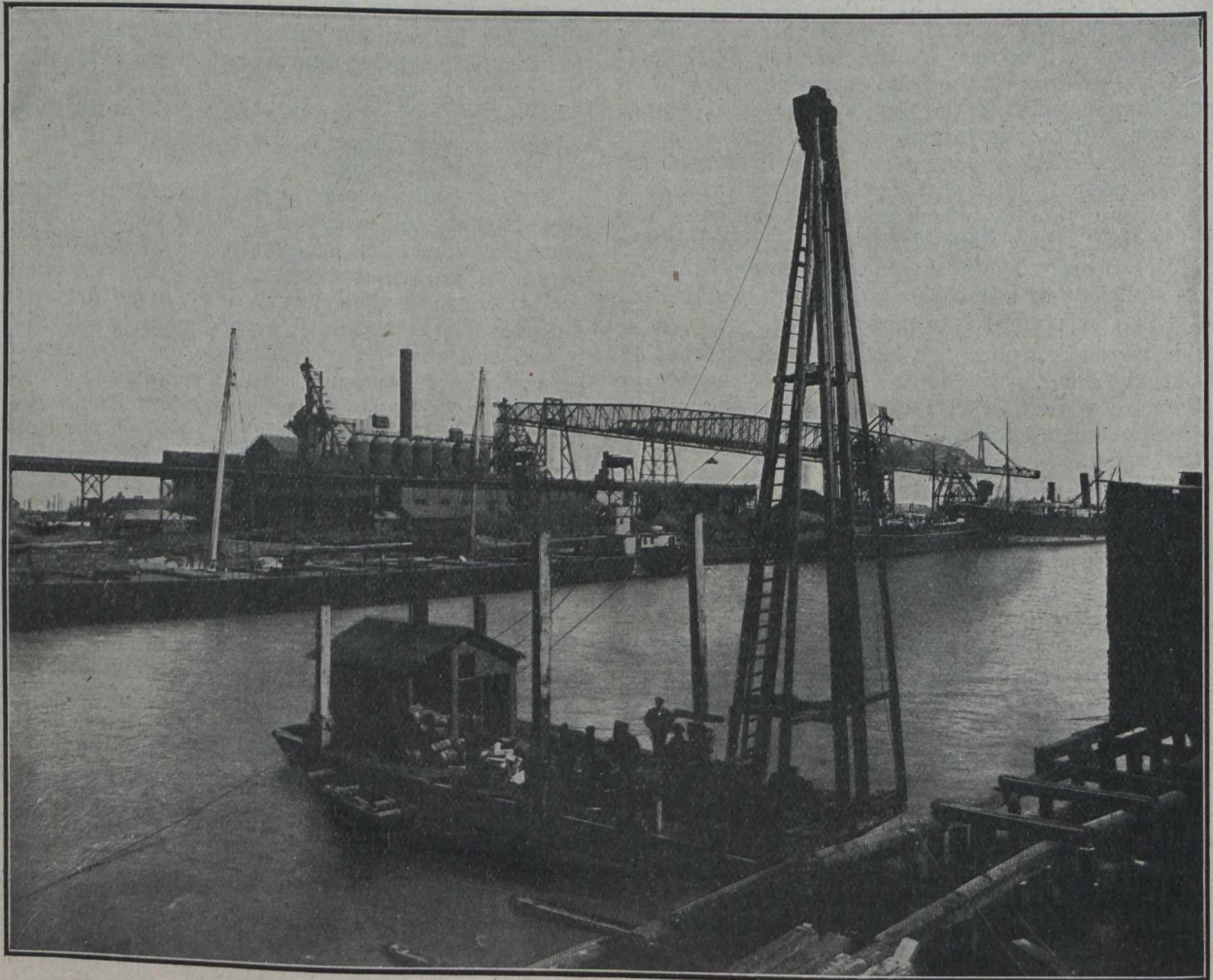
This question was discussed a number of years ago, and many writers enthusiastically declared that the new white metal, aluminium, then being put on the market for the first time, was the metal of the future, and the solution of the difficulty. This idea has had a considerable setback, for, although aluminium has been on the market for a number of years, selling at a little over thirty cents per pound, nothing revolutionary has happened and several producing aluminium works got into financial difficulty. However, the consumption of alumi-

## IRON MINING IN NORTHERN ONTARIO

By A. B. WILLMOTT

Sault Ste. Marie, Ont.

During 1906 the exploration for iron ore throughout Northern Ontario has progressed with vigor, and some discoveries of importance are reported to have been made. The known iron ranges of Ontario now surpass in numbers the various ranges on the south shore of Lake Superior, but beyond the rough outlining of the ranges comparatively little exploratory work has been done. The tendency has been to locate the iron ranges, comply with the Government regulations, and then to hold the



BLAST FURNACES AND UNLOADING DOCKS, ALGOMA STEEL CO., SAULT STE. MARIE

nium has gradually increased, and the metal is becoming better understood. Possibly now with the high-selling price of copper the uses of aluminium may be developed.

As regards the other base metals, the same fear might be expressed of an ultimate shortage, as in the case of copper, but to a less extent. Possibly in the far future aluminium may replace even these metals for many of their uses.

As for the precious metals, silver and gold, I will not attempt to foretell the future demand, but leave it for the economist, banker, statesman, etc., to determine what percentage of these metals are necessary. I might hazard the opinion that gold with all its attractions is not an essential good or evil.

lands for sale, or as possible sources of future or supplies. Speculative holders have done the former, whereas large iron consumers have done the latter. In very few cases have actual ore bodies been proved by exploratory work. Undoubtedly were our iron ranges located south of the international boundary line a vastly larger amount of diamond drilling, test pitting and other exploratory work would have been done, with a view to finding ore bodies. Our newspapers and public men are accustomed to speak of the large iron deposits in Ontario, when as a matter of fact there has been up to 1906 but one shipping mine worthy of note. It is true that the surface indications and geological conditions lead us to infer that iron ore may be found in quantity in Ontario, but with a few exceptions this supposition has yet



to be proved. The following notes give a brief description of the more important work of the past year.

The Atikokan Iron Company have connected their mine with the Canadian Northern Railway, and will be ready to ship ore in the spring of this year, and by that time the furnace which is being built for them at Port Arthur is expected to be completed. The ore is a high grade magnetite, low in phosphorus but high in sulphur, so that the ore must be roasted. The company are installing their own coke ovens for the manufacture of the coke required, and will use the by-product gases for roasting the ore. The completion of this furnace should open a market for a considerable quantity of the low grade ores in the Port Arthur district which are not

able part of the purchase price has been paid, and the purchasers claim to have several million tons of hematite ore in sight. There is little doubt but that the purchase will be completed. With the property goes a railway charter for a road from the mines to Thunder Bay, between four and five miles distant. Ore docks are to be built there, and will afford cheap transportation. Compared with other ranges round Superior this rail haul is very short, and should offset the extra cost of mining which is likely to occur. The ore is of good grade, but lies flat, and is bedded with lean portions which will have to be picked out.

Nothing has been done during the year with the iron ores lying east of Lake Nipigon, in the vicinity of Pop-



HELEN MINE

rich enough in iron to stand the expense of long shipment.

During the year a discovery has been made of hematite ore, about ten miles northeast of Port Arthur. The ore lies near the surface, and it is expected can be mined by steam shovel. The Dominion Mines & Metals, Limited, has been formed with a capital of \$1,000,000 to operate this and other properties, and they are pushing their development work actively. A railroad of several miles will have to be built to connect with the Canadian Pacific Railway, and the ore will be shipped over the Canadian Northern Railway docks at Port Arthur. The company hope to begin shipments during the season of 1907.

The Loon Lake properties, owned by Messrs. Marks and Wiley, Hogan, Flaherty and Knobel, are under option to a company of American capitalists. A consider-

lar Lodge. Dr. Coleman, of the Bureau of Mines, has made a careful study of these ranges, and his report should shortly appear. The right-of-way of the Nipigon Railway from Lake Superior to Lake Nipigon is now being cut out, and it is expected that construction will shortly start. The completion of this road will make possible the shipment of ore from these Nipigon ranges, and should encourage active development. Sixty miles to the northeast of Poplar Lodge other iron-bearing lands have been taken up by the United States Steel Corporation and others, but no development work has been done.

In the Michipicoten country some claims have been taken up near Pucaswa, showing rather lean magnetite on the surface.



Nothing has been done on the Iron Lake or Frances Mine properties during the year. At the Josephine Mine operations by the Algoma Commercial Company, Limited, were stopped because of a dispute regarding the title to part of the property.

Operations at the Helen Mine were seriously hampered by a fire which in the early summer destroyed the crusher building and machine shop. New buildings were erected, much more convenient than the old ones, and the latter part of the season the output was increased to normal proportions. The total shipments for the year 1906 were 121,555 long tons, making the total shipments from the mine to date about 1,200,000 tons. This is by far the largest amount of iron shipped from any iron mine so far exploited in Ontario. It is expected the shipments for 1907 will be considerably larger than for 1906. The ore shipments for 1906 have been marketed in the United States and at Hamilton and Sault Ste. Marie, Ontario.

Some prospecting was done along the Algoma Central Railway north of the Soo, but nothing of consequence was found. The Williams and Breitung properties are at present closed.

At Moose Mountain, forty miles north of Sudbury, considerably surface work was done during the year, the land being cleared and camps erected. The Canadian Northern Railway was graded from Sudbury to the property. This winter ore docks are to be erected at Key Inlet on the Georgian Bay. The management fully expect to be shipping ore sometime during the summer. A very considerable body of magnetite of high grade is exposed on the surface of a hill, and the mining will be open quarry work for some time.

At Temagami some exploratory work was carried on by the Temagami Iron Mining Company during the past summer. This company have two and a quarter miles of banded jasper and iron ore, and are searching for the concentrations which are likely to occur at points along the range. The surface of the property was carefully examined by trenches and test pits, and a little diamond drilling done. The work is to be continued this year.

In Boston township, on the Temiskaming & Northern Ontario Railway, a somewhat similar deposit is being explored; diamond drills are at work this winter testing the property.

In Eastern Ontario some small trial shipments of ore were made from the Farnum property in Hastings county. The ore is a high grade magnetite of bessemer grade. A branch of the Central Ontario Railway was built into the property during last fall, and the management expect to ship 100,000 tons during the coming summer.

The consumption of iron ore in Ontario is rapidly increasing. Last year there was in the neighborhood of 280,000 tons of pig iron produced, which represents over 500,000 tons of iron ore. Of this only a small part was furnished from Ontario mines, the remainder being imported from the United States. As the revised bounties adopted by the Dominion Government are now more favorable to Canadian ores, we may look for an increase in the shipments from Canadian mines. Unfortunately there are almost no companies in Ontario attempting to supply iron ore. There are a great many firms and syndicates willing to sell reputed iron properties for large sums, but almost none have faith enough in their properties to develop them and sell iron ore. It is to be hoped that the new bounties will stimulate owners of iron lands to become ore producers.

## DIMITRI IVANOWITCH MENDELEEF

BY W. HODGSON ELLIS

Few men have left a deeper impress upon the scientific thought of our time than the great Russian chemist, the news of whose death has just reached us. His name will rank among the chemists of the latter part of the nineteenth century, as that of Dalton did among those who flourished at its beginning.

Distinguished no less as a patient and accurate investigator, than as a profound philosophical thinker, and while his brilliant speculations have illuminated the whole field of chemistry, and have proved a lantern to lighten the feet of a host of explorers in the paths of pure science, he was equally strenuous and equally successful in the endeavor to turn the searchlight of science on the problems of daily life and aid in developing his country's resources.

Siberia is hardly the place to which the eyes of the world would look to await the coming of a prophet of science, nevertheless it was there that the discoverer of the periodic law was born, just seventy-three years ago. His father was director of the gymnasium (high school) of Tobolsk. His mother, like so many of the mothers of great men, was a remarkably capable and energetic woman. While Dimitri, who was the youngest of her seventeen children, was still an infant, her husband became blind, and the care of the family devolved upon her. This task she fulfilled in an admirable manner. She established a glass works, to the management of which she brought so much ability and industry that it became a successful concern, and she was able to keep her charges in comfort and give them a good education. Her youngest son, after passing through the gymnasium at Tobolsk, was sent to the University of St. Petersburg to study chemistry, with a view to assisting in the management of the works. For some reason, however, he University, and, after finishing his studies there, he became a teacher in a pedagogical institute, connected with the same a teacher in a gymnasium in the Crimea. On the breaking out of the Crimean War he removed to Odessa, and shortly afterwards became Privat Docent in the University of St. Petersburg. Here he began a series of researches on specific volumes, and showed such promise that the Russian Government sent him to Heidelberg, where he pursued his studies for two years. In 1863 he was made Professor of Chemistry at the Technological Institute of St. Petersburg, and in 1866 he obtained a similar chair in the University.

His researches on specific volumes, begun in 1855, were continued during fifteen years. Since 1870 much of his work has been devoted to the elasticity of gases.

It is, however, as the enunciator and elucidator of the periodic law that the name of Mendeleef is most widely known. In 1869 he read a paper before the Russian Chemical Society, in which he showed that "the properties of the elements are a periodic function of their atomic weights." In this and subsequent papers he elaborated this idea and arranged the elements in the order of their atomic weights, showing how they fall into groups in the manner now so familiar to us as "Mendeleef's table."

Mendeleef was not the first to arrange the elements in such an order, nor the first to point out the periodicity of their properties. Newlands, in England, and De Chancourtois, in France, had done this several years before. But no one before had worked out the problem so thoroughly, so logically, and so successfully. Even then



chemists were by no means eager to accept the idea. But when, in 1875, Lecog de Boisbandrau discovered gallium and described its properties, Mendeleef pointed out that he had predicted in 1871 that a gap in his table corresponded to an undiscovered metal which he called eka-aluminium, and to which he had ascribed properties which exactly corresponded to those of the new metal. Subsequently two other predictions, ekaboron and ekasilicon, were fulfilled by Scandium and Germanium. The scientific world was taken by storm.

The new law was accepted by acclamation, and ever since it has been of the utmost service in suggesting lines of investigation and pointing out the probable road to truth. It is interesting to note how all the principal nations of Europe assisted in the establishment of this law. The law was first announced in England; the atomic weights upon which it is based are those of an Italian, Canzaro; it was developed and formulated in Russia; and France, Scandinavia and Germany each contributed a new element to prove the correctness of its predictions.

But Mendeleef did not confine the energies of his powerful mind to speculations, or even to investigations, in pure science. He was at all times ready to place his talents at the service of his country.

It was largely due to his efforts that the monopoly which had paralyzed the oil industry of Baku was removed. The enormous development of the industry which followed this step is familiar to everyone. He was sent by the Government to the Caucasus and to Pennsylvania to report on the wells and refineries in those localities, and his reports were of the greatest value to the scientific and industrial world. He made a study of the specific gravity of mixtures of alcohol and water for revenue purposes, which was a model of careful and accurate work. Indeed, through his life he was employed by the Russian Government in researches of various branches of industrial chemistry, and has been, since 1893, chief of the Bureau of Weights and Measures at St. Petersburg.

It is characteristic of him that, while engaged in useful investigations and thoroughly sympathizing in their object—the betterment of the condition of his countrymen—he never lost sight of their scientific side.

As a result of his work on the density of alcohol, he developed a theory of solutions; and his study of the oil deposits led to his well-known theory as to the origin of petroleum by the action of superheated steam on metallic carbides.

Mendeleef was no philosophical recluse. He held strong views on social and political questions, and was at all times ready and willing to assert them in the press or upon the platform. He was an enthusiastic protectionist, and strongly advocated a tariff framed so as to build up the industries of Russia.

He was a member of the Council of Commerce and Industries.

A plebiscite was recently taken in France as to who was the greatest Frenchman of the nineteenth century. It is a most gratifying evidence of that strong common sense which distinguishes the French people, that Napoleon came low on the list, while at the head of it, with a large majority, stood Pasteur. I do not know whom the people of Russia would name as the greatest Russian of the nineteenth century, but if genius of the very highest order devoted to the successful investigation of nature and a life consecrated to the service of his country constitute greatness, then Russia can claim no greater son than Dimitri Ivanowitch Mendeleef.

## CORRESPONDENCE

*The Canadian Mining Journal*, while it welcomes letters on current topics, is not responsible for opinions expressed by its correspondents.

## SPECULATION IN MINING STOCK—A SUGGESTION

To the Editors:—

Sirs,—As I am sure that you intend in your new *Mining Journal*, which I am glad to welcome, to discountenance all wild speculation in mining stock, such as we witness to-day in the Cobalt mining district, will you kindly give me a little space for a few remarks on this subject?

A very rich mining district has been found at Cobalt, but it will not be of permanent benefit to our Province if from day to day and from week to week the manufacture of millions of dollars of paper money continues to be sanctioned and authorized by our Provincial Government under the form of "stock certificates" of the numerous new Cobalt mining companies daily incorporated and chartered by the Provincial Government. There seems to be no stop to it. Every new week brings its fresh millions, and the Department of the Secretary of State is overworked and has been for months granting out new charters, permitting such terrible onslaughts on the savings of the public.

Will no one stop this disgraceful and most dangerous gambling? The Government becoming somewhat alarmed has given a warning in the Speech from the Throne at the recent opening of the Legislature, but it seems to me, Mr. Editor, that in such a crisis we want more than an academic warning, even though it comes from the throne. It seems to me that we should have an effective remedy and a prompt one. Surely we have a right to expect this from the Government, which justly prides itself in having stopped the Toronto Junction and Fort Erie poolrooms shortly and quickly after it came into power. To stop this one form of gambling and, on the other hand, to continue to sanction and authorize another form of gambling much more insidious and in which larger sums are at stake, is an anomaly which the Government should not tolerate. As it is at present, the Government not only tolerates this gambling, but in fact creates it by the granting of their own charters to any new company for any capitalization named and without any restriction whatsoever.

But now is the opportunity for the Government to at once check this, as the Hon. Mr. Hanna has just introduced a new Companies' Act, which I notice was read the second time yesterday, and the details of which were referred to a committee. Let this new Act provide that before a charter is granted it will be proven to the satisfaction of the Secretary of State that ten, fifteen or twenty per cent. of the total capital stock petitioned for has been paid into the treasury of the company and stands there *bona fide* for the purposes of the company, and at once it will become impossible to have in any new district three or four hundred million dollars of capitalization on, mostly, wild schemes. A similar provision is to be found in the Dominion Companies' Act, and it seems to me is a simple, sure and safe remedy for the Government to adopt to protect the public, and I earnestly hope that this provision will become a part of the new law.

Yours very truly,

EUGENE COSTE.



## SPECIAL CORRESPONDENCE

## BRITISH COLUMBIA

## CARIBOO.

The heavy snowfall this winter assures an abundant water supply for gold placer mining in Cariboo district the ensuing season, and, consequently, the recovery of gold should be larger than during the two seasons past. It may not be expected to show any considerable increase, though, until after the Cariboo Gold Mining Company (the Guggenheim organization that early last year acquired the property of the Consolidated Cariboo Hydraulic Mining Company, which had for years been operating at Bullion Quesney mining division under the management of John B. Hobson) shall have largely increased its water supply and thus provided for a full season's gravel washing each year. The work of bringing in more water is not likely to be sufficiently advanced to admit of this company recovering much gold in 1907. Several hydraulic mines in the Cariboo division of this large district should, however, yield more gold than during recent years, for much of their dead-work has been completed and their water supply increased. The two chief deep drift mining companies, the Cariboo Consolidated, Limited, operating at La Fontaine on Lightning Creek, and Slough, Creek, Limited, on Slough Creek, should this year add to the production of gold from this district. The former last season during two or three late summer and fall months recovered sufficient gold to pay operating expenses, and the outlook is that the great flow of water from the ancient river channel tapped will be still further kept down and more rich gravel be taken out and washed. At Slough Creek additional steam power, a large winding engine and two 500 gallon skips will supplement the work of the big pumps, so that here, too, the water should be disposed of to an extent that should admit of the mining of gold-bearing gravel with resultant good returns.

## EAST KOOTENAY.

The St. Eugene lead-silver mine at Moyie, owned by the Consolidated Mining & Smelting Company of Canada, continues productive and still possesses large reserves of ore. Its output of shipping products during the calendar year 1906 consisted of about 3,500 tons of crude ore and 25,000 tons of lead concentrates. The mine is stated to now be in a better condition than at any previous time in its history, recent underground work having disclosed the occurrence in the lower levels of the mine of big chutes of ore, the existence of which was not known before.

The Sullivan mine is maintaining its average weekly production of 500 to 600 tons of lead ore, which is reduced at the company's smelter at Marysville, a few miles from the mine. The North Star and Stemwinder, near Kimberly, are both being worked. On the latter has been discovered a big body of ore, which is reported to need concentration before shipment to the smelter.

Deep snow and severe cold have made the hauling of coal and coke from the Crow's Nest Pass Coal Company's collieries difficult, so that production is not as large at present as when transportation conditions are favorable. Notwithstanding this the Coal Creek mines made a record output on January 29th, with a tonnage of 2,600 tons. When the weather shall again be mild and sufficient railway cars be available, the production of this company's mines will no doubt soon reach a larger monthly total than in any previous year. The demand

for Crow's Nest Pass coal and coke is active, and, given adequate transportation facilities, will continue to steadily grow.

## CASSIAR.

At Atlin, too, prospects are good for an increased yield of gold next season, for on two or three of the richer creeks the claims of the individual miners have been bought out by companies which will operate on a much larger scale and with power appliances that will handle considerably more gravel than has been washed in past seasons.

The Atlin Consolidated Mining Company, stated to be a Guggenheim enterprise, during the forty-one days it was able to wash gravel on Pine Creek after the installation of its seventy-five-ton steam shovel and system of electrically operated dump cars last season, found this method of working profitable; so it is understood to intend to put in two more steam shovels.

The two Ruffner Companies—Pine Creek Power and North Columbia—have made provision for an abundant supply of water for their operations on Pine Creek. It is estimated they will have a supply of 5,000 inches per day during the whole of the washing season.

The Amalgamated McKee Creek Mining Company purposes installing a steam shovel. This and another company, Hamshaw Bros., of New York, are largely interested in, are stated to have been working economically and making good profits. The French company, known as the Societe Miniere, operating on Boulder Creek, is also reported to have done well and to have excellent prospects for the coming season.

In Northern Cassiar the Berry Creek Mining Company has about completed its deadwork and the management expects that the coming season's returns will well repay the company for its outlay during the several years it has been doing preparatory work—bringing in water, installing hydraulic equipment, erecting buildings, etc. After completing its water supply system last season gold to the value of \$21,750 was recovered during 109 24-hour days' gravel washing. As much top dirt had to be hydraulicked before pay gravel could be washed, this result is regarded as much below what will be achieved this year with the pits in shape for work under more favorable conditions. From one pit an average of \$475 per diem was obtained last season during a run of twenty days.

## WEST KOOTENAY.

Ainsworth mining division has a number of lode mines at work. In the old Ainsworth camp the west side of Kootenay Lake, the sale last fall of the Krao mine to Butte, Montana, mining men, directed much attention to the camp, interest in which has been revived by the discovery late in the summer of rich silver ore in the Krao. A number of properties that had long been idle are now being worked, and prospects are good for a busy year and an enlarged production of ore.

Across the lake the Blue Bell is being developed and has big showings of ore, which the Canadian Metal Company, owning this mine, purposes concentrating before shipping to the smelter. The erection of the concentrating mill will probably be undertaken shortly, the manager of the company, S. S. Fowler, having already prepared plans and had levels run for bringing in water. The development of the Argenta, situated on Hamill Creek, at which a power plant was installed last autumn, is being proceeded with. Several mines on the south fork of Kaslo Creek are showing up well under



development. The Cork mine and concentrator have been proving satisfactory to their French owners. The Province and Montezuma will have their own concentrator in operation later this year. Both the Whitewater and Whitewater Deep, in Whitewater camp, are being operated under lease. A big tonnage of ore and concentrates is accumulating at the Kootenay Ore Company's sampling works at Kaslo, awaiting orders for shipment to the smelters.

In the Sloean work is being continued on mines in the McGuigan, Sandon, Cody, Three Forks and Sloean Lake sections of this extensive district. At the Rambler-Cariboo the raise to connect the deep-level tunnel driven at 1,450 feet depth with the bottom of the 800-foot shaft, is approaching completion. It is reported that ore of good grade has been met with in this raise and that the prospects for the mine are promising. Among the mines around Sandon that are being worked are the Payne, Last Chance, American Boy, Ruth and Richmond-Eureka. In the vicinity of Sloean Lake, the Standard, Vancouver Group and Hewitt are most prominent, while about Sloean City the Ottawa and Arling-ton, among others, are being further developed.

About Nelson the La Plata mine and mill on Kokanee Creek are being operated. During the first five weeks of the year about 2,200 tons of ore were milled, and between 400 and 500 tons of product shipped to the smelter. The Eureka, a copper property, is being steadily developed, and several gold properties in the vicinity of Nelson are also at work.

Financial arrangements have been made in London to provide for a resumption of work at Ymir gold mine. Some high grade silver ore has been encountered in the Hunter V. mine, which has arranged to maintain regular shipments of its lime-silver ore to two or three district smelters. The Second Relief, Queen, and Arling-ton, in the Salmo-Erie section of Ymir district, are all making satisfactory progress.

Rossland mines are developing most satisfactorily. The Consolidated Mining & Smelting Company of Canada has extended its holdings here, these now including the Centre Star, War Eagle, Iron Mask, Enterprise and Idaho. The first named two are being explored at considerable depth, their main shafts being the deepest in the Province. The tonnage of ore available for mining is stated now to be larger than at any previous time since these mines were opened. The big working shaft of the Le Roi is being deepened; it is now down about 1,600 feet. Le Roi No. 2 is keeping up its shipments of first-class ore to the Trail smelter, and is milling lower grade ore at its own concentrator. Its production during five weeks of this year was about 2,200 tons. The Consolidated Company's mines produced about 6,000 tons and the Le Roi 12,000 tons during the same period. The White Bear is developing an ore chute on its 800-foot level; this gives promise of proving sufficiently productive to shortly admit of a fair tonnage being shipped regularly.

#### BOUNDARY.

Between a shortage of fuel and the unusual severity of the winter, the big copper mines of the Boundary district have been operated under much difficulty. This will be evident when it is pointed out that the output of the Granby Company's mines during January was less than 1,000 tons per day, while notwithstanding the interruption caused by the coal miners' strike last autumn, their daily average production for the whole of 1906 was about 2,200 tons. There is not likely to be

much improvement until the difficulties mentioned shall have been removed.

Beside the Granby mines, those of the British Columbia Copper Company and the Dominion Copper Company have been working as best they could under conditions far from favorable. All three companies have kept their respective smelting works in operation, but necessarily below their full capacity. It is hoped, though, that mines and smelters will be again operating on their customary scale before the close of February.

In the Similkameen, weather conditions have also been against the working of the Nickel Plate mine and the forty-stamp mill at Hedley. It is probable that here, too, conditions will not long remain unfavorable.

#### COAST.

Official figures of production of ore at the Britannia mine, owned by the Howe Sound Copper Company, which last year acquired the mining property of the Britannia Copper Syndicate and the smelting works of the Britannia Smelting Company, show that 108,396 tons of copper-gold ore were mined in 1906. Of this quantity 65,844 tons were milled at the company's concentrating works at Britannia Beach, Howe Sound, producing 12,612 tons of concentrates, which, together with 35,726 tons of crude ore, were shipped to the Britannia smelter at Crofton, Vancouver Island, and 6,826 tons of ore went to other smelters. The tonnage smelted at Crofton during the year was as follows: Britannia ore, 20,546 tons, and concentrates, 11,393 tons; Mt. Andrew (southeast Alaska) ore, 3,445 tons; custom ores, furnace products, foreign matte, etc., 19,208 tons; total, 54,592 tons. The production of metals was: Copper, 4,409,560 lbs.; silver, 38,265 ounces; gold, 5,261 ounces. Improvements recently made at the smelter are expected to add considerably to the treatment capacity of the works.

The Tyee Copper Company has deepened the main shaft of its Tyee mine at Mt. Sicker to 1,250 feet, and sinking is still in progress, the intention being to reach the 1,450 foot level in the spring. Low grade ore has been met with on the 1,000, 1,150 and 1,250 foot levels. Concentration tests are being made, the company planning to concentrate the large tonnage of low grade ore developed in the mine. The shaft on the company's X. L. claim, adjoining the Tyee, has been sunk to 550 feet, and further sinking is to be undertaken here. The quantity of ore treated in 1906 at the Tyee smelter at Ladysmith, Vancouver Island was: Tyee ore, 23,823 tons; custom ores, about 5,500 tons. The metals produced were: Copper, 2,115,617 pounds; silver, 77,085 ounces; gold, 3,776 ounces. The total value of these products, after deduction of cost of refining and purchase of custom ores, was \$396,500.

The Wellington Colliery Company during 1906 mined 790,018 tons of coal in the following proportions: Comox (Cumberland) mines, 408,901 tons; Wellington (extension) mines, 381,117 tons. Coke made during the year at the company's ovens at Union totaled 13,058 tons; total sales in 1906, including coke taken from stock, were between 17,000 and 18,000 tons. The Western Fuel Company's mines produced 373,700 tons of coal, 290,000 tons of which came from No. 1 shaft, Esplanade and Protection Island Mines, Nanaimo, and 83,700 tons from No. 4 mine, Northfield. The gross output of the coal mines of Vancouver Island was thus 1,163,817 tons.

So active was the demand for locally-made Portland cement during 1906 that the Vancouver Portland Cement Company enlarged its works at Tod Inlet, near



Victoria, Vancouver Island, by one-half, bringing the capacity up to 900 barrels per diem. A further enlargement having been found necessary, more buildings, power plant, grinding machinery and another kiln are being added to the works. Practically all the Portland cement used in the Province last year was manufactured at Tod Inlet, where the company already has storage room for 75,000 barrels and ample shipping facilities for all the cement it will be able to manufacture, even with much enlarged works.

### ALGOMA, ONTARIO

Active work is now in progress on the Campbell mine, near Bruce Mines. This property, which was leased from the Copper Mining & Smelting Company of Ontario, Limited, in August last, is owned by Messrs. John McKane, of Tonopah, Nev., "Lucky" Scott, of Pioche, Nev., and Dr. Campbell, of Rossland, B. C., and is considered to be one of the most promising in the district. The vein, which is sixteen and a half feet wide on surface, carried high grade copper ore in good paying quantities. A boiler and hoist have recently been installed and a shaft, now forty feet deep, is being sunk which, it is expected, will strike the vein at a depth of 100 feet. A company is now in process of formation for the purpose of taking over and working the property.

Mr. E. Sjostedt, of the Superior Power & Rolling Mills Corporation, Sault Ste. Marie, visited the Bruce Mines, now being worked by the Copper Mining & Smelting Company of Ontario, Limited, on February 14th. He visited the company's plant and the 400-ton concentrating mill, which he considered they were exceedingly fortunate in finding already built for them on the property when it was taken over from the former owners, The Bruce Mines, Limited, and expressed his surprise at the improvements and additions which had been made on the property since his last visit some seven years ago. Mr. Sjostedt is on a tour of inspection of the various copper properties in Algoma with a view to obtaining information as to the probable amount of ore available for the proposed new smelter at Sault Ste. Marie, Ont.

The Jury Mines, Limited, have recently offered 25,000 shares of their capital to the public at 10c each. Their property is situated a few miles from Dean Lake, and a promising showing of good grade chalcopryitic copper ore is reported. A shaft has already been sunk to a depth of forty-six feet, and another has now been commenced. A shipment of ore has been made to the Blue Island Smelter at Chicago.

Mr. T. Hayes-Sheen, general manager of the Copper Mining & Smelting Company of Ontario, Limited, has left for London, England, to attend the annual general meeting of the company.

### COBALT

Cobalt, Feb. 22, 1907.

*Coniagas.*—Work is being rapidly pushed forward on the Coniagas.

A twelve drill air compressor has been installed and the foundations are being laid for a hundred ton concentrating plant, containing Hancock jigs, Frue Vanners and Wilfey tables; also a Huntington mill. They are also putting up a large sampling plant. This plant is being installed by the Allis-Chalmers-Bullock Company of

Montreal, and when completed will be one of the finest in the country.

A new vein of smaltite and native silver has been found on the Victoria Silver Cobalt Mines property. This important discovery was made within six feet of the contact between the diabase and conglomerate. The vein did not show on the surface, and was opened as a test to see if the contact did or did not mean anything. It is now twelve inches wide.

The great confidence that is placed in the future of the camp and the amount of development work already taking place is shown by the large orders of machinery that have been placed. The Rand-Jenckes have installed over 25 plants. The more important are, at the Coniagas, a 12 drill duplex steam compound air compressor and 100 horse-power boiler; at the Colonial, a 12 drill compressor and three 100 horse-power boilers; at the King Edward, a 12 drill compressor and two 100 horse-power boilers (this plant will be ready in about ten days and promises to be one of the finest yet erected); at the Buffalo Mine, a second half of a complete duplex steam compressor; at the Provincial, first half of a six drill duplex steam compressor and an 80 horse-power boiler, also large hoisting engine; Kerr Lake Mining Company, Nancy-Helen, Townsite and Victoria Mines are also having large plants installed by the same company.

The Allis-Chalmers-Bullock people of Montreal are also very busy installing machinery in the camp. Among the more recent installations are the Green-Meehan ten drill compound air compressor and two 100 horse-power boilers; the Right-of-way, ten drill compressor, a large double drum hoist and one 100 horse-power boiler, also a lighting plant; the Temiskaming Mining Company, five drill compressor and large hoisting engines and a direct-connected lighting plant; the Cleveland Cobalt, three large belt-driven air compressors; the McKinley-Darragh a ten drill compressor and two 100 horse-power boilers and lighting plant. This company are also erecting a five stamp mill.

The Portage Bay district is at present attracting a great deal of attention from mining men of Cobalt, and they feel confident that future development will show this to be a district of great richness. Already the present working mines are showing up large veins of ore and gold in quantity is also found on a great many properties. It is expected that during the spring and summer development many more finds will bring this place into importance.

A great many prospectors are already going into the Montreal River district and Temagami Reserve, where the late rich finds have called attention to the widening of the mineral belt, and this part of the camp will share honors in the spring with Larder Lake.

*Cobalt Lake Mining Company.*—Cobalt Lake is seven-eighths of a mile long and comprises fifty-two acres. It is surrounded by the Nipissing, O'Brien, La Rose, Right-of-way, Trethewey, Coniagas, Buffalo, Silver Queen and McKinley-Darragh mines. It lies at the centre of the geological disturbance and among the greatest producing mines. The Cobalt Lake Mining Company paid the Government one million and eighty thousand dollars for the right to mine underenath the waters of the lake and a strip 33 feet wide on the east shore. Operations, mainly of a prospecting nature, have been carried on for about two months. The largest and richest vein discovered is No. 4, which angles across the 33-foot strip and enters the lake. It is very rich in visible native silver. A development shaft is being sunk and has attained a



depth of about fifteen feet. One hundred and fifty feet to the south, vein No. 5 is being developed by a shaft now down 20 feet. The values, small at the top, constantly increased with depth, until native silver was struck at a depth of about 18 feet. Two hundred and fifty feet north of No. 4 a vein of solid niccolite a foot wide was recently discovered. This is now being prospected. Besides these, there are many veins which enter the lake along the eastern shore, being developed by shafts and test pits. Fully a third of the shore line yet remains to be stripped.

A group of Toronto capitalists are organizing a company for the purpose of building and operating a plant for concentrating local ores. The concentrator is designed to profitably treat all ores carrying over \$110 per ton, and will have a capacity of about 100 tons per day.

For the week ending February 16 the Trethewey mine shipped three cars of ore, aggregating nearly ninety tons. These are the first shipments from that mine for 1907.

The Kerr Lake Crown Reserve Mining Company, which bought its property from the Government for \$178,000 and a 10 per cent. royalty, are working a diamond drill on the lake.

The Nova Scotia mine has shipped a car of cobalt ore to Swansea. The mine has shipped silver ore before, but not cobalt.

Prospectors are daily setting out for Larder Lake. Many also are going up the Montreal River.

The buildings in Montreal Cobalt are nearly completed, and the machinery is on the ground. The plant should very shortly be in running order.

The *Canadian Mining Journal* wishes to thank Mr. H. P. Davis for a very complete and accurate blue-print of the Cobalt district.

#### PORT ARTHUR DISTRICT

*Silver Mountain Mines.*—Notwithstanding reports industriously reported to the contrary, (in the East), Mr. Hanson's force of miners are not operating in the silicious or "churty" formation peculiar to the lower horizons of the argillaceous black slate formation. On the contrary—and as proven conclusively by their rich strike of high grade smelting and milling ore made in their workings on the 14th inst., the prospect for a continuous run of shipping ore of excellent quality—never, even the palmiest days of the "Shuniat Weishu," looked better. As a result of the very pronounced results from recent development at the West End Mine, unusual activity is being displayed in investigating several outlying mines and prospects in this vicinity, and, as a matter of fact, a few of those old prospects have changed hands, and other mining organizations, as the "Amalgamated Silver Mining Company," as formed to operate them at an early date. The conditions for economical mining are now much improved, compared with the early nineties—when no roads, either wagon or rail, existed—while the demand for the white metal is also improving.

*Gold.*—Near the famous Aticokan iron mine, on Sabawa Lake—on the Rosa Blande—some very satisfactory exploratory and experimental mill work was lately conducted—some eighteen tons of ore yielding from off the plate \$540 in gold. The No. 1 shaft is down 50 feet.

*Aticokan Mine.*—Two miles east of the Rosa Blande, on the north bank of the Aticokan River, are located the substantial and commodious camp buildings, stores and mining plant, of the Aticokan Iron Company, and im-

mediately north, in the elevated ridge, running parallel with river and camp, and rising to an elevation of 150 feet above the water, are the practically inexhaustable magnetic iron ore deposits of this company. A spur line of three miles has just been completed from the main line of the Canadian Northern Railway to the mine, where everything is in readiness for regular shipments to their blast furnaces at Port Arthur—now nearing completion.

*The Tip Top Copper Mine.*—This property is situated within nine miles of Kashabowie station, on the Canadian Northern Railway. It is owned chiefly in Port Arthur. Capt. Dick Candoe, with a force of miners, has been steadily at work here for several seasons, and as they mine is splendidly equipped with compressor plant, etc., it was no surprise to find many thousand tons of ore in their stock piles. The Tip Top vein is nowhere under 60 feet in width, while in the lower workings its width continues to expand. In addition to its high percentages of copper, the Tip Top is also distinguished as carrying considerable gold. Arrangements are in progress for the erection of a smelter for the reduction of this ore, either at the mine—on the shores of Round Lake—or at Port Arthur, the head of navigation on Lake Superior, and the question of transportation, etc., in this connection is just now occupying the attention of the owners and the management of the Canadian Northern Railway.

*Native Copper.*—Some three or four, apparently, rich lodes carrying nuggets, shot and finely disseminated copper in the amygdaloidal trap formations, are about being opened up in Nipigon, Black and Cloud Bays, on the north shore of Lake Superior.

#### QUEBEC

Summary statement of mineral products:—

These figures are still subject to some corrections, but are practically correct in a general way.

*Asbestos.*—First-class crude 1,461 tons, value \$325,530; second-class crude 2,456 tons, value \$320,115; fibre 18,068 tons, value \$783,722; paper stock 39,330 tons, value \$676,556; total, 61,315 tons, value \$2,105,923.

*Mica.*—Thumb trimmed 210,000 lbs., value \$128,000; split 73,000 lbs., value \$23,000; rough culled 116 tons, value \$18,000.

*Chrome Iron.*—First crude 731 tons, value \$9,542; second crude 4,005 tons, value \$33,934; concentrate 4,047 tons, value \$46,982; total 8,803 tons, value \$90,458.

*Iron.*—18,331 tons of iron, worth \$61,175, have been used in two blast furnaces, having produced 7,851 tons of pig iron, worth \$177,643.

*Copper Pyrite* (Approximately).—40,000 tons, value \$200,000.

*Ocre.*—2,785 tons, value \$33,420.

*Phosphate.*—690 tons, value \$4,100.

*Felspar.*—1,091 tons, value \$3,818.

*Graphite.*—175 tons, value \$8,300.

The total value of the mineral output, including the building materials, represent close to five millions and a quarter dollars.

#### NOVA SCOTIA NOTES

The shipments from the principal collieries for January do not in a majority of cases compare at all favorably with the shipments of the corresponding month of last year.

The Cumberland Railway & Coal Company's shipments were cut nearly in two, or a decrease of some 23,-



000 tons; the Dominion Coal Company's shipments fell off by some 25,000 tons, and the Intercolonial made a small loss of 500 tons. The two companies that made a favorable showing are the Acadia and the Inverness Railway Coal Company, the former making a gain of five and the latter of ten thousand tons. The falling off in the Cumberland Railway Coal Company's shipments is accounted for by the partial stoppage of work, owing to an outburst of damp, which had to be walled off. The Dominion Coal Company's loss is attributable to a lessened demand from the Steel Company.

There were complaints during the month of a shortage of cars. The complaint has become all but chronic.

The Dominion Coal Company will not be in a position to bank much coal this month, as 12,000 tons will be daily required to fill orders. The company intends shortly to open a mine, or perhaps two, on its extensive areas in what is known as the Lingan or Victoria district. It is known that three fine seams exist here. Some urge the company to give the famous, the now historic, Mullin's seam a trial. Others urge that the Victoria seam should be opened, as affording one of the best coals on the Island. Some of the officials have a leaning toward the Lingan seam, which produces a good gas and coking coal. The company was very much hindered in its operations last year through a scarcity of laborers, or, to be more exact, loaders. This year it will, if possible, try to overcome this obstacle. At present a representative is scouring Scotland, and another is off to Italy, in a quest for laborers.

Development work is still being forced at the Allan

On the ground that eighteen inches of the top coal in shafts of the Acadia Coal Company. It will be some time yet before these are large producers.

the seam is of only medium quality, the management of the Inverness Railway Coal Company gave instructions to leave the coal on. The miners claim that the lessened height lessens their pay, and made a demand for an increased rate. This the manager refused. Meantime the miners are working under protest, and will wait till the opening of navigation before pressing their claims.

The union men at Sydney No. 3, the largest colliery of the Nova Scotia Steel & Coal Company, stopped work the beginning of the second week of the month, in an effort to induce some 150 men not in the union to join their ranks. After a couple of days' stoppage they were successful, but the colliery remained idle the whole of the week, as the management were not prepared to start when the men had settled their differences.

The general impression is that wintry weather is of benefit to the coal trade. This may be if snow storms are not included. This last January was much more severe than the previous one, and yet the trade did not benefit.

## COMPANY REPORTS AND NOTES

### NOVA SCOTIA STEEL

At a meeting of directors of this company, held in Montreal on February 17th, the following report to be submitted to shareholders at the annual meeting thereof was duly approved:—

Your directors submit herewith their sixth annual report, with statement of assets and liabilities, and abstract of profit and loss account for the year ended December 31, 1906.

The total volume of business transacted by the company during the past year was considerably larger than that of any previous year, although, owing to the blast furnace at Sydney Mines being out for relining during the months of November and December, the output of pig iron was not very much greater than during the former year. The sales for the year increased \$956,000 over the preceding year.

From our steel department we shipped 42,831 tons of finished material, being an increase of practically 50 per cent. over 1905.

The quantity of pig iron sold, however, was very much smaller than the previous year, being 16,872 tons, as against 28,723 tons during 1906, due partly to the fact that a larger proportion of the output of the blast furnace was made into steel, and partly to the furnace being out of blast during November and December.

On December 31 we had orders on our books for 22,000 tons of steel at better prices than prevailed during 1906.

The quantity of coal mined exceeded that of the previous year by 126,172 tons, the company still being the second largest producer in Nova Scotia.

Early in the year we began the driving of submarine slopes for the purpose of reaching and opening up our sea areas in Wabana. Good progress has been made with this work, and the results obtained strengthen the belief of your directors that these submarine areas may prove to be a valuable asset of the company.

Your directors are pleased to report that the profits for the year 1906 were \$960,281.03, as compared with \$559,906.63 for the preceding year.

The amount to the credit of the profit and loss account on January 1, 1906, was \$795,325.03, which, with the profits of the year, make a total of \$1,755,606.06 to the credit of this account on December 31, 1906.

The regular dividend of 8 per cent. on the preferred shares has been paid quarterly.

The sum of \$101,878.75 has been transferred to the credit of the special reserve fund—of which \$75,000 is for general depreciation and renewals, \$12,378.75 for blast furnace renewals, being 25 cents per ton on the output of pig iron during the year, and \$14,500 for depreciation of the shipping property owned by the company.

During the year this reserve fund was charged with the sum of \$29,215.28, being the amount expended in relining the blast furnace, and the further sum of \$50,000 was charged against this account to provide against loss which the company may make in connection with its railway to Sunny Brae.

The amount to the credit of this fund is now \$650,989.51, as compared with \$628,326.04 at the beginning of the year.

The balance carried forward to the credit of profit and loss on the 1st of January, 1907, is \$1,180,783.89, as against \$795,325.03 on the 1st of January, 1906.

The sum expended on capital account in plant and improvements, in acquiring iron ore areas, submarine coal areas, and real estate at Montreal and elsewhere amounts to \$199,256.10.

Your directors have aimed to place the company in a strong financial position before resuming payments of dividends on the common stock. They have also thought it desirable before resuming these dividends that there should be a reasonable certainty of their continuance under normal business conditions. While the profits for the past year, and the amount now at the credit of the profit and loss account seem to warrant the payment of



a dividend for the past year, the directors believe that the interests of the shareholders will be best served by passing it. They have declared a quarterly dividend of one and a half per cent. for the first three months of the year 1907, payable April 15th, to shareholders of record on March 31, 1907.

### DOMINION COAL

The Dominion Copper Company's report for a period of 13 months to December 31, 1906, shows that 225,946 tons of ore were treated, from which 4,405,522 pounds of copper were produced, which netted the company \$300,000, an average profit of about \$28,000 per month. This production was obtained from the operation of the two furnaces which were in the plant at the time the present management took charge.

A despatch from Rossland says:—Two ore shoots of considerable magnitude and of good grade have been located on 800-foot level of White Bear. The management is much pleased over the finds, and feels confident that White Bear has the markings of a valuable mine. Coke is moving more freely, and considerable has been received at Le Roi smelter at Northport. It is expected that Le Roi smelter will resume operations about March 1. At Centre Star new converters and rock-breakers started up on trial run to-day, worked satisfactorily. The breaker has a capacity of 1,000 tons in ten hours, and will break rock at mine instead of doing it at the smelter as heretofore.

Shipments for the week were:—Centre Star, 1,410; Le Roi, 3,150; Le Roi No. 2, 510. Total for week, 5,070, and for year 35,377 tons. At Trail smelter, 4,136 tons received during week.

A considerable enquiry is reported to have sprung up recently for gold properties in the Rainy River district. A fine sample is reported to have been brought from the vicinity of Wabigoon, running \$20,000 to the ton in gold. In the past the gold ventures in the Rainy River district have not been successful, possibly owing to the expensive plants ordered by developers.

### PIG IRON IN CANADA

The production of all kinds of pig iron in Canada in the calendar year 1906 amounted to 541,957 long tons; of which 525,716 tons were made with coke, 16,021 tons with charcoal, and 220 tons with electricity.

The iron made is classed as below:—

	1905.	1906.	Changes.
Foundry and forge...	146,698	130,120	D. 16,578
Bessemer pig ... ..	149,203	165,609	I. 16,406
Basic pig ... ..	172,102	246,228	I. 74,126
Total ... ..	468,003	541,957	I. 73,954

The total increase was 15.8 per cent. Canada has not made spiegeleisen or ferro-manganese since 1899.

On December 31, 1906, Canada had 15 completed blast furnaces, of which 8 were in blast and 7 were idle. Of the total 12 usually use coke for fuel and 3 use charcoal. In addition one furnace, to use coke, was being built and 3 coke furnaces were partly erected on December 31. Work on the partly erected furnaces was, however, suspended some time ago.

During the week ending February 9th, 1907, forty-one companies, twenty-one of which were mining companies were incorporated in Ontario. The total capitalization of the mining companies was \$20,635,000; of the industrial companies, \$2,755,000.

### BOOK REVIEWS

The Cruise of the Neptune—a report on the Dominion Government Expedition to Hudson Bay and the Arctic Islands, on board the D. G. S. Neptune, 1903-1904, by A. P. Low, B.Sc., F.R.G.S., officer in charge. Ottawa—Government Printing Bureau, 1906.

In this substantial volume Mr. Lowe gives a direct, uncolored but vitally interesting account of the voyage of the D. G. S. Neptune.

Commissioned in the summer of 1903, the Neptune left Halifax on August 23rd of that year. After cruising along the shores of Baffin Island, through Hudson Straits and across Hudson Bay to Chesterfield Inlet, the winter was spent in Fullerton Harbor.

During the long winter, a season of confinement and loneliness, when everything depends upon keeping the officers and men cheerful and in normal health, Mr. Low encouraged all to supplement their routine duties by hunting and attending lines of fox-traps. "This proved," he writes, "much better than formal exercise at stated times and the general health remained good throughout this long period of enforced idleness."

In the course of the succeeding summer's cruise formal possession was taken of Ellesmere Island, in the name of King Edward VII.

The account of the whole voyage is brief and entirely readable. It is followed by an historical summary of Arctic explorations from the voyage of Frobisher to that of Sverdrup.

Then follows an exceedingly graphic account of the manners, customs and moral characteristics of the Eskimos. This section is well worthy of careful perusal.

The geology of the countries touched upon is next developed. Mica mining is being carried on at Lake Harbone, on the north side of Hudson Strait. Referring to the Nastapoka iron deposits, Mr. Low says: "Most of these ores would require separation from the bands and lenses of jasper. The position of the ores on the islands separated from the mainland by a sound varying from a mile to four miles in width, with excellent, almost tideless, harbors, constitutes ideal conditions for shipment." He points out that advantage could be taken of the magnificent water power of Nastapoka River, "which falls 160 feet into the sea within a few miles of the best ore deposits. . . ." No coal is found in Hudson Bay, so that economical smelting near the mines cannot be attempted, until electrical smelting becomes practicable.

The chapter on whaling makes stirring reading. That on navigation of Hudson Bay is of definite value. Mr. Low speaks with authority upon this subject. Let us quote him again. "The period of safe navigation for ordinary steamships through Hudson Strait and across Hudson Bay to the Port of Churchill, may be taken to extend from the 20th of July to the 1st of November. This period might be increased without much risk by a week in the beginning of the season and by perhaps two weeks at the close."

The "Cruise of the Neptune" is typographically attractive. The photographic illustrations are well chosen. Mr. Low writes crisply and breezily, and nowhere is the reader burdened with any attempt at decorative descriptions.

Altogether, for profit and pleasure, we heartily recommend the book to our readers.



## MEN AND MATTERS

F. J. Pope, a graduate of the Kingston School of Mines, has gone to Chile to examine a mine for the Guggenheim interests.

J. L. Parker, at one time manager of the North Star Mine, East Kootenay, British Columbia, and for the last two years manager for the Brown-Alaska Company of New York, with mines at Hadley, Prince of Wales Island, southeast Alaska, and Portland Canal, British Columbia, has retired from the latter position and opened an office at Seattle, Washington, as a consulting mining engineer.

T. T. Fulton, B.Sc., lately of the laboratory staff of the Dominion Iron & Steel Company, Sydney, has been given charge of the laboratory of the Londonderry Iron & Mining Company. Mr. Fulton assumes his new duties on March 1st.

E. L. Fraleck, M.E., has accepted the position of superintendent of the Cobalt Lake Mining Company, Cobalt, Ont.

During the month of January, 1907, the continuous rod mill of the Dominion Iron & Steel Company, Sydney, N. S., rolled 7,966 gross tons of iron rods. This is the largest tonnage ever rolled in one month by a rod mill of the continuous type.

The equipment of mines in the Cobalt district is proceeding apace, and at nearly all the principal properties machinery is being installed. One manufacturing firm alone reports that since last spring orders for fifty-six complete plants have been received and filled.

It is questionable whether any mining district in the world can show an achievement equal to Cobalt in the matter of early establishment of mines on a satisfactory dividend-paying basis. To all intents and purposes the camp is barely three years old, yet at least half a dozen mines are now paying handsome profits. Thus: Buffalo is paying dividends at the rate of 12 per cent.; Foster, 36 per cent.; Nipissing, 20 per cent.; Silver Queen, 32 per cent., and recently McKinley-Darragh, 24 per cent. In addition, there are many profit-earning mines owned by individuals and close corporations whose returns are large.

In the House of Commons the other day Dr. Thompson, member for the Yukon, called attention to the possibility of another international difficulty over the Alaskan boundary. The boundary country between the Yukon and Alaska was attracting gold seekers, and should rich strikes be made the uncertainty of the boundary line might cause complications. Dr. Thompson also stated that the boundary between the Yukon and British Columbia was unsettled, and asked the Premier, for a statement on both points. The Premier replied that he had no information at present regarding the British Columbia boundary. The Alaskan boundary had been delimited ten years ago by Mr. Ogilvie, of the Canadian service. The United States had refused to accept this survey, and now a further delimitation was in progress. A curious feature was that so far as the work had gone, it had been found that the Ogilvie line, which the United States refused, was 350 feet too favorable to the American Government. "However," said Sir Wilfrid, "they acted within their rights in refusing it and now another delimitation is in progress."

At a meeting of the Board of Directors of the British Columbia Copper Company, Mr. Colgate Hoyt was elected president, in succession to Mr. F. S. Underwood; Messrs. E. B. Lawrence and F. S. Sumner, vice-presi-

dents, and Mr. R. H. Eggleston, secretary-treasurer of the company. Messrs. E. Hawley, C. A. Starbuck and B. B. Lawrence were elected members of the Executive Committee.

Large additions to the plant of the Ottawa Car Company, Ottawa, Ont., are contemplated. The company is branching out into the construction of steam railway rolling stock.

The Dominion Mining & Smelting Company announce that they are about to start operating their copper smelter at Picton, N. S. They advertise for copper ore.

Early in February J. R. Blackett resigned his position as auditor of the Dominion Coal Company, Glace Bay, N. S. Mr. Blackett had been with the Coal Company since its inception.

## LEGISLATIVE VISIT TO SCHOOL OF MINING

A notable event has been the visit of the Ontario Legislature to Kingston on Wednesday, February 6th, School of Mining and Agriculture. Some fifty members on the invitation of the Board of Governors of the school, with Hon. Mr. Mathison, Provincial Treasurer; Hon. Mr. Cochrane, Minister of Lands and Mines; Hon. Mr. Monteith, Minister of Agriculture; Hon. Dr. Wiloughby, Hon. Mr. Graham, leader of the Opposition, and Deputy Ministers Thos. W. Gibson and C. C. James, were carried to the old Limestone City by special train, arriving there at 2 p.m. They were received at the station by Hon. Wm. Harty, chairman of the Board; Principal Gordon of Queen's University; Dr. Goodwin, Director of the School of Mining, Mayor Mowat, and others. On the train piloting the visitor were Mr. D. M. McIntyre, vice-chairman of the Board, and Mr. G. Y. Chown, secretary-treasurer.

The visitors were taken in cabs to the Eastern Dairy School, which has done so much for the dairy industry of Eastern Ontario. Thence they were taken to the buildings of the School of Mining, where they were shown laboratories in operation in the various departments, including the mining laboratory, where were seen various products, including corundum, zinc ore—extracted by processes originated there. The long procession then passed through the buildings of Queen's University to Grant Hall, where luncheon was served. This fine audience chamber easily accommodated the 175 who sat down to table with Chancellor Fleming of Queen's University as chairman. At five o'clock the students marched in and filled the gallery. They took charge of the entertainment from that time on.

The toast list brought out speeches from Principal Gordon, the Ministers, and others, in the course of which it transpired that the members of the Legislature had a most friendly feeling towards Queen's University and the School of Mining. The governors of the latter are asking the Government for further aid to provide accommodation and instructors for the large numbers of students now coming in. The Ministers in their speeches referred to this and promised that the Government would give aid, but on the understanding that the friends of the School of Mining and of mining education should come to its help.

The excursionists returned to Toronto at 8 p.m., impressed with the valuable educational work being done in Kingston.