

(December 21, 1908.)

The Mineral Resources of Canada.

BY PROF. W. G. MILLER.

ADDRESSING the Canadian Club on "The Mineral Resources of Canada," Professor W. G. Miller, Provincial Geologist for Ontario, said:

Mr. President and Members of the Canadian Club.—My subject covers a wide field and time is short. In taking up the subject therefore I must be brief. I shall endeavor to discard the vocabulary usually adopted in talking minerals and mineralogy and deal, as briefly as I can, with the mining industry in the past, the handicaps it has experienced in its progress, its present prospects and future possibilities.

In the past the industry has suffered a number of drawbacks. Our educational system has not been calculated to develop the mining industry. Canada has suffered by reason of the lack of technical instruction in its schools. Mineralogy and geology have been taught only in theory. We have had a number of natural born mining engineers, but they had to go abroad to get their training. I am glad to say, however, that the authorities are now awakening to their opportunities and the needs of the country. During the last twenty years three or four good mining schools have been established with thoroughly practical courses, where good practical mining engineers are being trained. These schools have stamp mills where the ore can be treated right under the eyes of the students, and splendid results are being attained.

Now let me be quite frank. To my mind one of the great drawbacks to mining development in this country has been the boasting of the agricultural to the detriment of the mineral resources of the country at large, and particularly of Ontario. Mining, however, is coming into its own. Old mining laws and regulations hindered development, but the Government has seen a great light and changed the regulations, so that now "blanketing" in mining districts is almost impossible.

Let us look at present conditions. I do not want to weary you with figures, except for a moment. In the United States the mineral output amounts to \$25 per head on an 80,000,000 population. Canada's output only amounts to \$12.50 for a

population of 7,000,000. Still Canada's output is increasing yearly. In 1897 it totalled \$28,000,000, while in 1907 it reached the grand total of \$86,000,000, or a three-fold increase. This is a very encouraging increase and is largely the result of changed conditions and the existence of our mining schools.

Canada has exceptional mining possibilities. The Rocky Mountain chain, extending from the far north right down through Mexico, has produced an immense amount of minerals, principally gold and silver. In British Columbia this development has been much smaller than in the United States and Mexico, but that only goes to show the great possibilities of our Western Province. In Canada we have vast ore fields not possessed by either of the other two countries, but little attention has been paid to these fields because of inexperience. Iron ore and copper would be the metals found there, and in the district in a rough way surrounding Hudson's Bay from its southern end away up to the Arctic circle, where there is evidence of coal existing in plenty. These big fields could easily be mined, as the climate compares favorably with the Yukon territory. In addition there is an abundance of water power. Where rock strata of a like nature extended into Michigan, the mines have produced 40,000,000 tons of iron ore annually, while the copper producing qualities of that state are well known.

A recent issue of the *Canadian Mining Journal* contains a significant statement. The Canadian Mining Institute recently invited some of the representatives of the British Institution of Mining and Metallurgy to accompany them on a tour of inspection in Canada. They came and this is what they have to say:

"The impressions we received of Canada as a whole were most favorable, and this remark applies also to the country as a field for mining enterprise.

"It appears to us the natural resources offer abundant opportunity for development, in which English capital might be profitably employed. Results in the past, it is true, have not been uniformly encouraging, but this was probably more due to the methods adopted than to an absence of conditions for properly working.

"American capital appears to have been more successful than English capital in Canadian mining, and it is not difficult to understand this when it is considered that one can get on the train at Montreal or Toronto in the evening and be in New York the next morning.

"English capitalists would, we believe, stand a much better chance of securing some of the good things as they come along if, instead of waiting to have things brought to them in London, they had an agent or representative resident in Canada. New developments and discoveries are, in our opinion, sure to occur from time to time, and we think this prospect, together with the chances of participating in the development of already existing enterprises, should be sufficient inducement to English capital to give more attention to Canadian mining than heretofore.

"We cannot conclude these notes without paying a very warm tribute of thanks and kindly feeling to our Canadian hosts and brother engineers for their great kindness and hospitality. They treated us well, made us welcome, and gave us a unique opportunity for obtaining a bird's eye view of the present state of the Canadian mining industry."

Reverting at this point to a map displayed on the wall of the room Prof. Miller dealt with the mining output of Ontario. Cobalt now produced one-ninth of the world's silver. While last year it stood fourth, this year it should exceed the leader—the State of Montana—by 6,000,000 ounces, placing the Ontario district in the premier position.

Our silver deposits are unique, he continued. Five years ago similar deposits to those in Cobalt to-day were found in Port Arthur, and we know that the mineral cobalt has been found away up in the great Bear Lake district. There is no reason why another Cobalt should not be discovered up in that great northern country.

The progress of the mining industry in Ontario during 1908 has, on the whole, been satisfactory. In two departments of that industry the position of the department among the Confederated Provinces is unique. These are the production of silver and the production of nickel. It is not too much to say that Cobalt is one of the most remarkable silver camps that has ever been discovered. Absolutely unknown until the autumn of 1903, that field, up to the end of 1908, has produced about 35,000,000 ounces of silver, having a value of, say, \$20,000,000. This is not only a large and permanent addition to the wealth of the community, but a substantial portion of the world's production of silver.

During the 12 months just closed the output of the mines of Cobalt has amounted to about 17,000,000 ounces of silver, worth, say, \$8,500,000. The world's production of silver is estimated for 1908 at under 160,000,000 ounces per annum,

so that Ontario is yielding about one-ninth of the total output. There is no reason apparent why production on this scale should not be maintained or even surpassed. The mines of Cobalt are, at the end of 1908, better equipped, more economically managed, and in a position to save a larger percentage of the values than ever before.

In 1904, the first year of production, there were four producing mines; in 1905, sixteen; in 1906, seventeen; in 1907, twenty-eight; in 1908, twenty-nine. The total quantity of ore shipped from the camp during the year was about 25,430 tons, which was several thousand tons more than all the shipments up to the end of 1907, the total shipments to date being 47,855 tons. No doubt the declining price of silver had a tendency to restrict production during the last twelve months.

As was to be expected, the average value of the ore shipped from Cobalt is now less than it was when the mines were first opened, having fallen from 1,309 ounces per ton in 1904 to about 670 ounces during 1908. There is little or no decrease, however, as compared with 1907, when the shipments averaged 677 ounces per ton. An explanation of the decline in value is to be found in the large quantities of low-grade ore which have been shipped during the last two years. Formerly only the first-class material was shipped, but now large consignments of poorer quality are being forwarded to Denver, where they have been found suitable for mixing in the smelters with certain western ores. It must be borne in mind that "low-grade" and "high-grade" as applied to ores in Cobalt are words of relative significance. Anything below 150 ounces per ton is low-grade at Cobalt. The utilization of these low-grade ores is now becoming a feature in Cobalt practice, several of the mines being equipped with up-to-date concentration plants. Custom works have also been opened.

A good deal of money has, no doubt, been unwisely spent in Cobalt, as in all other mining camps, and a tremendous amount of sky-rocketing and company-mongering has been carried on, greatly to the detriment of legitimate mining business, but it cannot be denied that real mining in Cobalt has been very profitable, and more money has been realized in a shorter space of time than, perhaps, in any other mining camp in Canada. The returns by way of dividend up to the end of 1908, including the unpublished profits of close corporations, will exceed \$10,000,000.

Permanency cannot be predicted of any mining field, for all mineral deposits, however large, are strictly limited in quantity, and when the ore is taken out there is an end of the mine. The life of the Cobalt camp will in the end depend upon the richness of the veins in depth, but that life will undoubtedly be prolonged by the discovery of new veins within the limits of the known field, and there will also be extensions of the valuable area or new areas of a similar character will be brought to light. The latter process is now in full vigor. The South Lorraine camp, where some good finds have been made, is separated from the Cobalt area by ground which has not yet proven valuable; up the Montreal river the James township section contains several promising prospects; farther west, at Bloom, Everett, Miller, and other lakes, the same assemblage of minerals as at Cobalt has been found, including considerable native silver. Still farther west, Gowganda lake is reputed as having produced specimens of native silver equal to those found in the early days of Cobalt. Gowganda will, doubtless, experience a rush next spring, but whether the geological and other conditions are as favorable as at Cobalt, time only will determine.

The newer silver fields of the Montreal river region are at present destitute of railway communication, and even of good wagon roads. These defects will, doubtless, be supplied with reasonable promptitude if the fields are valuable enough to warrant the expenditure. The Canadian Northern railway, it is understood, contemplates the extension of the Moose Mountain branch by way of Burwash and Welcome lakes to Gowganda, while the T. & N. O. railway, by continuing the spur line from Charlton to Elk lake, would connect with the James township area.

The production of nickel in 1908 will be about the same as in 1907, when the Sudbury mines yielded 10,602 tons. This constitutes the larger share of the world's production, the only other producing mines being those of New Caledonia in the South Pacific ocean. The Sudbury ore yields copper as well as nickel, and the copper output for 1908 is likely to be somewhat in excess of that for 1907, when the yield was 7,003 tons. The Canadian Copper Company continues to be the chief producer. The company draws the bulk of its ore from the Creighton and Crean Hill mines. The former is an immense deposit of rich ore, higher in nickel than in copper, which is being worked as an open quarry while in the Crean Hill mine, which is also a large one, the propositions of the

metals is reversed. The Canadian Copper Company's smelting plant at Copper Cliff is extensive and well equipped, the product of the furnaces being Bessemer matte, containing about 80 per cent. of combined nickel and copper. At Victoria Mines, the Mond Nickel Company's operations are carried on on a smaller scale. This company also produces Bessemer matte, which is refined in Wales, the Canadian Copper Company's product going to New Jersey.

The northern nickel range has long been known to contain large bodies of ore, but these have hitherto been inaccessible owing to want of railway facilities. The Moose Mountain branch of the Canadian Northern passes within two or three miles of the largest of the ore bodies, and the Dominion Nickel Copper Company is now engaged in developing these mines. This company is composed of Canadian capitalists, who are quite able to carry their projects through to success.

The iron furnaces of Ontario continue to import much the larger part of the ore which they require. Several causes conduce to this, and it is altogether probable that if Ontario possessed many more producing iron mines than it does a large part of the ore smelted into pig iron in the Province would still come from the United States. There are very extensive ranges of iron formation in the northern part of the Province. Here and there upon these, workable deposits have been discovered, such as the Helen mine (hematite), Moose Mountain (magnetite), Atikokan (magnetite), and others. In other parts of the ranges, as at Temagami, there are huge outcrops of banded ore, which, on the surface at least, are too silicious for present use. Patient and persevering prospecting will undoubtedly reveal other deposits of good ore, and the application of modern concentration processes to the lean and sulphurous ores of northern and eastern Ontario will render available very large reserves of ore not now capable of being utilized. The output of iron ore for 1908 will be about the same as in 1907, when 205,295 tons were produced, while the pig iron product will also be on the same scale as in the latter year, when it aggregated 286,216 tons.

In the stratified rocks of southeastern Ontario petroleum, natural gas, and salt are found in large quantities. The yield of petroleum has been very largely increased by the coming in of the East Tilbury field in the County of Kent, which is now producing as much, if not more, than the older fields of Petrolea and Oil Springs. Natural gas is being produced on a large scale as compared with a few years ago. The counties

of Kent, Haldimand, and Welland are all underlaid by gas-producing rocks, and the inhabitants of the southwestern peninsula, including the cities of Hamilton, Brantford, St. Catharines, Niagara Falls, and many other towns and villages, enjoy the advantages of this ideal fuel for domestic purposes. We may look for still further additions to the oil and gas-producing territory of Ontario.

The salt industry is confined to the east shores of Lakes Huron and St. Clair, and the output continues to be about the same from year to year. In 1907 the production amounted to 62,806 tons.

Among the many branches of the mineral industry are to be reckoned those which produce materials of construction, including brick, lime, stone, and Portland cement. It is fortunate for Ontario that good building materials of the permanent classes are both cheap and widely distributed. The Portland cement industry has made rapid strides since its establishment in 1891. In 1907 the output was 1,853,692 barrels, and in 1908 it will undoubtedly be more.

Gentlemen, my time is more than up. I thank you.
