

"The great expense attendant on the moving of the quartz has had as much if not more to do with the failures that have hitherto, with but few exceptions, followed all ventures in the gold fields.

"No manner of doubt, however, can be entertained that the treatment of the quartz after extraction is still crude and imperfect, and the results obtained in our mills are far behind those of other countries."

With this premonitory hint of amendment being required, the results in the respective localities during the ten years ending 1881, may now be examined.

Average yield of gold per ton (of 2,000 lbs.) of quartz crushed.

	Oz.	Dwts.	Grs.
Tangier	—	12	5
Wine Harbor	—	15	2
Sherbrooke	—	15	6
Stormont	1	5	4
Renfrew	—	7	21
Oldham	1	2	3
Waverley	—	13	10
Montague	2	2	2
Caribou	1	—	9
Uniacke	—	15	13
Other districts	—	11	2

and an average yield from all localities of 18 dwts., 4 grs.

It may be here remarked that in the course of the ten years 1871-81, gold was discovered in several localities separated in some cases by a considerable distance, and these are of much interest in this respect, they give a large extension to the field of operations of much importance.

Although the average yield in the last named period shows a falling off in the yield of 3 dwts., 10 grs., still it cannot but be considered a high average.

As it is not the intention of the writer to deal minutely with each particular district in explanation of the cause of this difference of yield, but rather to treat the subject in the general sense, the production of gold in the next decennial period, viz., 1881-91, will now be given.

Average yield of gold per ton (of 2,000 lbs.) of quartz crushed

	Oz.	Dwts.	Grs.
Tangier	—	10	12
Wine Harbor	—	11	16
Sherbrooke	—	7	15
Stormont	1	7	15
Renfrew	—	12	17
Oldham	1	8	9
Waverley	—	11	5
Montague	1	8	7
Caribou	—	8	18
Uniacke	—	12	14
Other districts	—	18	16

and an average yield from all localities of 16 dwts. 4 grs.

This statement shows a further decline in the yield of 2 dwts.

The following aggregate statement may now be added, which shows the average yield over the entire period under review, 30 years, in each locality.

Average yield of gold per ton (of 2,000 lbs.) of quartz crushed:

	Oz.	Dwts.	Grs.
Tangier	—	13	9
Wine Harbor	—	13	17
Sherbrooke	—	15	20
Stormont	1	6	10
Renfrew	—	12	23
Oldham	1	2	17
Waverley	—	11	14
Montague	1	18	8
Caribou	—	15	6
Uniacke	—	15	13
Other districts	—	19	11

A general statement of the average annual yield of gold, embracing all localities, for the 30 years 1862-91, is given in the report of the Department of Mines for the year 1891, which shows an average yield over that period of 15 dwts. 7½ grs.

A further extension of gold mining occurred in this last period on which it may be remarked as noteworthy with respect to the localities, not only their geographical position, but also the average yield up to the end of the third decennial period.

In Queen's County, for instance, distant from the western range of operations in the eastern part of the province, about 75 miles, Whitburn, one of the localities gives an average yield in the five years ending 1891, of 1 oz. 10 dwts. 12 grs., and Malaga, in the three years '89, '90, '91, gives an average of 16 dwts. 11 grs. In this connection, as indicative of the range westward of the auriferous rocks, mention may be made of the operations at Kemptville in Yarmouth Co., about 50 miles farther west. Of this locality, it is stated in the report of the Department of Mines for the year 1885, that 133 tons of quartz yielded 624 ozs. of gold.

In another locality, Rawdon, situated to the north of Renfrew, gives not only expansion to the width of gold country, if the term may be used, but also shows a satisfactory average yield during the five years ending 1891 of 18 dwts. 11 grs.

One more statement may be added to this array of figures, which it is thought, cannot lessen, but, on the contrary, should intensify the value of the preceding statements. An examination of these figures shows that the lowest average yield in the three decennial periods is as follows, the same classification being maintained:—

Minimum average yield of gold per ton (2,000 lbs.) of quartz crushed.

	Oz.	Dwts.	Grs.
Tangier	—	6	22
Wine Harbor	—	6	18
Sherbrooke	—	7	09
Stormont	—	6	06
Renfrew	—	6	03
Oldham	—	10	21
Waverley	—	4	18
Montague	1	0	07
Caribou	—	9	13
Uniacke	—	6	00
Other Districts	—	5	05
And a general minimum average of	—	8	04

This inquiry may now enter on that stage of the investigation which bears on the other side, i.e., the cost of getting. It is shown in the preceding statements what has been the yield of gold, and it has been mentioned that during the first period of ten years, it was generally admitted that 10 dwts. of gold to the ton of quartz crushed, paid. Attention has been drawn to the inadequate means of extracting and treating

the gold; and, in most cases, to a general want of skill in those conducting the operations. It will not be out of place now to adduce some evidence regarding the cost of production in order to place the yield given in the statements at its fair value.

The circumstances of size of lode and its envelop, and the character of the quartz as regards the manner in which the gold is contained therein, have doubtless their corresponding variation in the cost of mining and treating; but as these circumstances prevail more or less in all gold mining localities, it may be permitted to refer to cost of production without special reference to conditions of position.

The writer is unable to give detailed figures in this connection from personal knowledge, and he quotes therefore from published statements which bear the stamp of authority.

One of the earliest references in this connection is made in the Chief Commissioner's report for the year 1869, in which it is stated that a lode at Laurencetown that yielded 16 dwts. per ton, was raised and crushed at a cost of \$4.

In other official reports it is stated that one lode at Tangier of mixed quartz and slate could be raised and crushed at a cost of \$2.50 per ton; and in another case, a yield of gold of 4½ dwts. "will pay all expenses." (a). In another locality the cost is placed at from 8 to 12 dwts. (b). These quotations refer chiefly to the first decennial period.

Inasmuch as there is considerable resemblance in all gold mining countries, it cannot be considered unfair to contrast the preceding statements of cost, due consideration being given to difference in cost of labor, materials, etc., with figures supplied from like sources as have been mentioned, of the cost in other gold fields.

It is stated in the case of two gold mines in Australia, with reference to the cost, as it may be inferred from the payable yield of gold, that at one of them 2 dwts. 21 grs. per ton proved sufficient to pay the proprietors ten per cent.; and at the other the average yield in 1870 was only 4 dwts. 20½ grs., in connection with which it is remarked that the quantity of gold lost in the early stage of gold mining in Nova Scotia "sufficed," in Australia, "under careful management to give a fair profit to the adventurer." (c). And it is added: "These results are due to the practical and intelligent application of the lessons taught by experience; and if this experience is utilized and as intelligently applied in Canada as it has been in Australia, there is no reason why equally satisfactory results should not be achieved."

Further quotations in this connection would but show an equally striking contrast as regards the yield of gold in other countries, which has more than met the cost of production.

There has now been placed before you such a representation of the circumstances of yield of gold and comparative cost of mining and treating as the writer has been able to abstract from authentic records, as regards the yield, and, as he believes, from very reliable sources of information as regards the cost of production. It remains to assert the conclusion to which the inquiry has led. What are the facts that have been adduced? Do they or not permit a positive answer to the query stated at the beginning of this paper viz., "Is Gold Mining in Nova Scotia worth carrying on?" In every locality in which gold mining has been carried on in Nova Scotia the average yield of gold has been from a minimum of —oz., 8 dwts., .04 grs. to a general average of —oz., 15 dwts., .07 grs. over the extent of country in which the various localities are situated; the area of auriferous rocks covering this extent being estimated as probably over 3000 square miles.

A large field of inquiry is open for tillage in connection with the auriferous rocks of Nova Scotia; numerous very interesting and important features are worthy of study and development, but, as has been stated, it was not the writer's intention to treat the subject from that point of view. No reference has been made to the number and variety of composition of the lodes in the respective localities, no suggestions have been made respecting the pay streaks and their probably profitable extension downward, no speculative ideas have been ventured with regard to the alluvial auriferous deposits that may exist of which a very competent authority has recorded his opinion that at several localities there appeared "all the conditions required for the occurrence of rich alluvial diggings." (d.)

Enough, has, it is hoped, been advanced to warrant the assertion that gold mining in Nova Scotia is destined to be an expanding and remunerative industry. The application of higher scientific and mechanical knowledge cannot fail to bring its own reward, and over the seemingly scattered localities, that are at present but the indices of extent of auriferous rocks it may be confidently anticipated that the joint efforts of the enlightend capitalist and the skilled operator will ere long thoroughly establish, as one of the permanent industries, this branch of the valuable mineral resources of Nova Scotia. The writer in conclusion desires to express the very earnest hope and belief that the Mining Society of Nova Scotia will be the means of contributing very materially to the association above referred to.

DISCUSSION.

On the conclusion of the reading of the last named paper, the Chairman said he considered it the most debatable paper of the evening, and called upon Dr. Gilpin to say a few words in regard to the condition of gold mining in Nova Scotia.

DR. GILPIN.—Unfortunately, I did not hear all of Mr. Rutherford's paper. There is one point, however, regarding the question of averages to which I would like to draw the attention of the Society and those here interested in the matter, and that is: That the annual average for any particular district may be misleading. For while it may be fairly true for the whole province, in a given district a small amount of quartz crushed may yield a very large average, and upon the following year a large amount of quartz may be crushed and give a very small yield. Consequently, the average for that district for a number of years is vitiated. Mr. Rutherford spoke of the yield as being from a maximum of eight pennyweights and upwards. I would only remark that there are a great many gold miners I know of who would be very pleased to have eight pennyweights as a maximum, and go a great deal below that point. In my opinion, the statistics show that the prospect of an increased output from the small rich leads is not very encouraging. In the future the greatest returns must be sought for in the mining and milling of low grade ores and by paying greater attention to the tailings.

THE CHAIRMAN.—The paper which Mr. Rutherford has just read, possesses, as I have already remarked, perhaps more debatable points than any other which has been presented this evening. It is too late to permit of a lengthy and detailed discussion, but I would like to call attention to one or two points the discussion of which could be elaborated at a future meeting. The first point has reference to the statement that the early milling was crude and that probably 30 per cent. of the gold in the quartz was lost. In the course of ten years' experience, I have never found a dump of tailings that it would pay to work over, nor which probably contained 30 per cent. of the original value of the quartz. I think this statement of the large early loss of gold should be stamped out, as it would lead to the influx of patent process men who guarantee to take out 100 per cent. of the assay value. The gold ores of Nova Scotia are of such an easy-free-milling character, that even with the crude appliances of 30 years ago, it would have been impossible to lose so large a percentage unless

(a.) Hind's Report on Uniacke, Renfrew and Oldham, 1872, pp. 53-56.

(b.) Hind's Sherbrooke Report, p. 58.

(c.) Selwyn's Report on Gold Fields of Nova Scotia, Geological Survey of Canada, 1870-71, p. 281.

(d.) Selwyn, ante, p. 16.