

lodes, but by the disintegration of vast masses of rock throughout which it has been disseminated. It has been definitely decided that the andesitic rocks of the Thames, for example, contain gold scattered through their mass, and it may have been from such that the rich auriferous gravels have been derived. He would be a rash man indeed who would dare to state positively on geological evidence alone that a particular stretch of country must, or could not possibly, contain payable gold reefs.

#### Methods of Working.

The majority of the deposits of auriferous quartz known to exist in New Zealand are at present neglected for reasons which will be subsequently considered.

The exploitation of a gold reef consists of :

(1.) Its discovery : This is mostly effected by the finding of its outcrop by a prospector. In some cases the presence of the lode vertically beneath a particular claim has been inferred from its strike and dip in an adjoining lease. In some cases the reef has been found as the result of many hundreds of feet of diamond-boring conducted in directions governed by the personal equation. The most usual practice, however, is to sink a winze on stone right down from the outcrop.

(2.) Its development : This consists of sinking shafts, rising, driving levels, etc., with the idea of blocking out the ore. When a sufficient quantity of ore is in sight—i.e., exposed on all four sides—it is, in good practice, thoroughly sampled, and if sufficiently good is stoped out and taken to the battery. Most of the exploratory work is done on contract, a price being given by competing parties of miners for each foot run of the work. Stoping also in certain mines is paid for on a tonnage basis, but otherwise mining in New Zealand is conducted on day-wages. During the drilling and blasting much fine dust is produced, which is liable to enter the lungs of the men engaged, and, setting up irritation there, to cause silicosis, or miner's phthisis.† At the Waihi Mine a jet of water is used in the hole during machine drilling, which to some extent reduces the quantity of dust thrown into suspension.

(3.) Its reduction : The stone is crushed to the desired size, and treated by various physical and chemical processes. A mere enumeration of the different machines in use would be of little value, but generally it may be said that New Zealand practice is quite up to that of other countries. The fact that mills in the colony show a low crushing-rate per head of stamps may be attributed to the unusual hardness of the quartz encountered; and this has also been the reason, probably, of the failure here of forms of ball mills and other machines which have done good work elsewhere. That the old-fashioned gravitation stamp-mill has been retained so generally by no means proves the ultra-conservatism of the New Zealand millman, for most of the inventions with *prima facie* claims to consideration<sup>1</sup>—and many without—have had a fair and exhaustive trial.

It is difficult to compare the operating-expenses of the mines of one country, or even of one district, with another; but it is safe to assume that the Keep-it-Dark Gold-mining Company (Reefton), with a total cost of 16s. 9d. per ton crushed,<sup>2</sup> is as cheaply conducted as any mine of similar size and dealing with a similar ore in the world.

#### Quartz-Mines from Investor's Viewpoint.

The figures which follow are taken from the annual reports of the Mines Department. They deal with the history of mining companies then operating up to the end of 1905: Paid-up capital, £1,576,829; value of product, £6,291,917; total expenditure, £4,395,366.<sup>3</sup> The record, however, is incomplete, in that several companies have been omitted. Some of these have been successful; others, again, have been less fortunate; some have even closed down altogether.

†Some consider, however, that the disease is due to the action of a special micro-organism. Whether this is so or not, it remains a fact that the quartz-dust is a primary cause.

<sup>1</sup> The Morison-Bremner high-speed stamp is a notable exception.

<sup>2</sup> Report of Department of Mines.

<sup>3</sup> Including paid-up capital.

<sup>4</sup> E.g., Progress Mines of New Zealand (Limited), which in seven years has paid 18s. in the pound on a share capital of £275,000.

No published return has been found by the writer which gives the figures under the above headings for companies which had gone out of business before the beginning of 1905. It is probably true that statistics could be prepared giving the nominal share capital of all the mining companies which have operated in New Zealand, and the amount which they have returned to shareholders; but such a comparison, even if possible without disproportionate labour, might only serve to place the industry in unmerited disfavour before the eyes of capitalists, for the total share capital of these companies would be very much in excess of the amount of money actually subscribed.

Shares (fully paid) to the amount of £600,000 might by some be added to paid-up capital in above; but in many cases the scrip was presented as reward for services which under the scheme proposed in later pages would never have been performed, and which in some cases never were performed. In this country, as in all others in which mining operations have been carried on along limited-liability lines, many properties have been floated only to die after a comparatively small sum had been expended.

It is also true that one company—the Waihi Gold-mining Company—has paid a very large proportion of the dividends; but neither this nor any of the above facts affects the point which it is desired to establish—namely, that investors as a body have no right to complain of New Zealand as a mining field. It cannot be said of this country that its reef-gold, for example, has cost more than £4 4s. 11½d. per ounce.

#### Lode Minerals.

The mining of lode minerals other than gold and silver would not make such a good showing,<sup>4</sup> but it must be remembered that in no case has the attack been pushed home by a sufficiently large and well-directed and attacking force.

It yet remains a lamentable fact that capital is not attracted as it should be. This is easily explained as regards local investors, all available capital being absorbed by house property, extensions of existing businesses, etc., or by the more attractive—to small people—gold dredging companies. The considerations influencing the minds of foreign capitalists are discussed in subsequent pages. It is the belief of the writer that if his suggestions are adopted the mining of lode minerals in New Zealand will gradually attain to the dimensions which its merits warrant.

It is assumed throughout this essay that the mining of the future will be done by limited liability companies. When an insurance company takes a risk on a property of great value they invariably reinsure portions with a number of other companies. In like manner a marine underwriter assumes only a small portion of a marine policy of insurance. Unless quartz-mining is followed in a mere gambling spirit, it is advisable for investors to spread their interests similarly over several properties, and limited liability companies are thus indicated.

To be Continued.

According to the report of the Department of Trade and Commerce for 1905-6, the trade of Canada showed an increase over the previous year of more than \$80,000,000, the increase in imports being \$27,450,000 and the increase in exports \$53,270,000. The duties collected amounted to \$48,737,941 as against \$42,905,990 in 1904-5. The total trade of Canada was \$550,872,645 compared with \$470,151,289 in the previous fiscal year. The trade of Canada with other portions of the British Empire amounted to \$227,778,608, an increase of about \$40,000,00. Trade with France increased from \$8,712,977 in 1904-5 to \$9,818,138 in 1905-6, and with Germany from \$7,788,793 to \$8,912,648 in the same period. Trade with the United States amounted to \$278,532,663 compared with \$243,444,961 in the previous year, and with Japan \$2,157,031 compared with \$2,425,712 in 1904-5. The sum of \$2,440,771 was paid in bounties during the year. The bounty on pig iron amounted to \$687,632, on puddled iron bars, \$5,875; on steel, \$941,000; on manufactures of steel, \$369,832; on lead, \$90,196; on binder twine, \$15,079, and on crude petroleum, \$291,157. During the year 229,062 vessels, including those employed on inland waters, arrived at and departed from Canadian ports. Of these, 188,993 were British and Canadian. The total tonnage of all vessels was 81,056,234.

<sup>4</sup> Above figures merely relate to gold and silver.