

and silver, particularly of the former. The explorations in the mines in which it is found are not sufficient to give any definite idea of its extent, but it is possible that it is much more extensive than its croppings suggest. The result of the assays made of this porphyry indicates that the rock contained silver and gold, and perhaps lead, after it solidified, and before any solfataric action could have affected it. Though the age of quartz-porphyry cannot be proved from this district, there can be no doubt, from its lithological character and its mode of occurrence in innumerable other localities, that it is pre-Tertiary, and far older than the rhyolite. That the solfataric action incident to this eruption had an effect upon this porphyry is extremely probable: at any rate, changes of a solfataric character were brought about in it, such as the formation of iron-pyrites and the concentration of gold and silver in that mineral from the porphyritic mass. Although it is not certain that the gold and silver in the mines of its immediate neighbourhood were derived from this rock, yet the amount of gold and silver it contains, and the transformation it has undergone, render it a possible source of those metals in the ores of the mines in the vicinity of quartz-porphyry rock. Assays from this rock showed that it contained silver to the value of 3½d. and gold to the value of 1s. 0½d. per ton. The nearer the body of ore the higher the percentage of assay, and the further away from such body the percentage was less.

Manner of Deposition of the Ore.—Mr. Curtis, in summing up the different probable theories as to the manner in which the ores were deposited in the Eureka Mining District, states as follows: "The solution containing the ore penetrated the limestone, passing through fissures and interstices in the broken rock, and deposited the ore when conditions of temperature and chemical activity were favourable to its precipitation. It is impossible to determine what may have been the chemical composition of the solutions which carried the ore, but it is not improbable that they consisted in a great part of metallic sulphides dissolved in alkaline sulphides. These solutions were necessarily formed under the influence of heat and pressure. Rising into the shattered limestone at a diminishing pressure and temperature, the liquids lost much of their solvent power, and many of the metals that they contained were precipitated. This precipitation could have occurred in only two ways—either through deposition in pre-existing large cavities, or through a substitution of ore for country rock. The manner in which the deposition took place has a very important bearing upon the probabilities of finding ore at any considerable distance below water-level."

There is no doubt the mining operations are conducted on a far larger scale in America than they are in this colony; but the mines here are only in their infancy, and those engaged or interested in mining pursuits require to direct their attention more to the formation of lodes and source of the ore. It is only by close investigation that this can be done, if ever it be absolutely determined. But there are always indications where bodies of ore are likely to be found if prospecting is conducted on an intelligent basis.

Mr. Pond, Colonial Analytical Chemist, Auckland, read a paper on the minerals of Cape Colville Peninsula some twelve months ago, before the Auckland Institute, giving an interesting description of those minerals and their value. The following is an extract:—

"*Gold.*—This metal is by far the greatest in value of any deposits hitherto found in the district. To the present time it has been discovered in the native state only, alloyed with more or less silver. The average percentage is about 64 of gold and 36 of silver. The probability, on further exploration, of finding gold in another form, is, I think, very great. But, at the present time, though we have it accompanying and attached to arsenic, antimony, and tellurium, it is only in the free state, and uncombined. The energy, however, which is now being displayed may make us acquainted with it in some other form than that with which we are familiar. When we bear in mind the wealth that has already been recovered from the district since 1854, and the extent of ground that has been proved auriferous, it can but be a matter of energy and time to still further enhance this total.

"*Silver.*—As I have already intimated, this metal has always been alloyed with the gold found in the reefs in this district, occasionally to a very large extent, but generally closely observing the ratios already given. The presence of silver in the form of pyrargyrite, or ruby-silver, has also been known for a considerable time. In this form it almost always accompanies the gold when found in rich deposits, and I have found it in specimen-stone to the extent of 200oz. and 300oz. to the ton. This is, of course, invariably lost in the ordinary process of crushing, owing to its not amalgamating readily with mercury. Another form in which it exists here, and, at present, gives promise of moderately large riches, is in the form of a telluride. This combination I first found in the Moa claim, at Te Aroha, and have since discovered it at Karangahake and Waihi, and anticipate that it will be probably found also at Waitekauri. It occurs in the reefs, very unevenly distributed through the stone, and invariably accompanied by magnetic pyrites in minute grains and crystals, in the same manner as the free gold at Te Aroha. Both tellurium and antimony occur combined with the silver at Karangahake, and on this account the profitable working of these ores will be a problem not easily solved. At Waihi the silver so far mined is almost entirely an antimonide, and it will be interesting to note the difference in the constituents of rich portions of ores taken from the Crown, at Karangahake, the Rosemont, at Waihi, and the Champion, at Te Aroha, showing the relative value of antimony and tellurium to each other in these ores, though the varying richness of the ores prevents an accurate deduction without complete analyses of each, which has only been carried out with the Waihi ore.

Waihi, Rosemont Gold-mining Company—

Silica	...	89.3	per cent.	Sulphide of antimony...	302	per cent.
Alumina	...	1.5	"	Gold	...	.021 "
Protoxide of iron	...	5.94	"	Silver	...	1.149 "
Lime	...	.49	"	Tellurium	...	A trace
Sulphide of lead	...	.05	"			
Sulphide of copper	...	.06	"			
					98.812	"