In carrying on mining, fresh evidences in new operations destroy the old at the same time; but every man engaged in developing these hidden treasures ought to note down the conditions in which deposits are found, so that knowledge can be gained and put together piece by piece to give us a clearer idea of the subject. The whole mining industry is in its nature transitory: but the Government of the country in which mining operations are carried on, intrusting men with the extraction of the mineral wealth, has a right to demand that the knowledge gained at the cost of its resources shall not be lost to science.

Seeing that on the two principal fields in the colony where quartz workings are being carried on there is a unanimous feeling existing among those interested in quartz workings to test the deep levels, it is therefore an opportune time to disseminate some knowledge in reference to the genesis of ore-deposits, and the views of men who have made this subject almost a life-study. It is a question which has many bearings, and, as stated at the onset, it is difficult to formulate any tangible theory that can be applied to all the conditions in which we find ore-deposits. We know that the specific gravity of the earth is 5·6; but, from what we know of the surface rocks, it is only about 2·6, therefore the interior of the earth must be a great deal denser than what is on the surface; and if we consider the interior of the earth to be or as ever having been in a molten state, the specific gravity of minerals and metals would necessarily carry them down to the lower depths towards the centre of gravity; and, if so, the metallic substances have come up in conjunction with the eruptive rocks to the surface. If this theory be taken, then we may expect to find the ore-deposit formed in two ways: (1) the deep-seated ore from ascending solutions; (2) the secondary deposits from descending solutions or lateral secretions.

It is very evident from the manner in which we find metal in the ore, especially gold and silver, it has not been deposited in the lodes in a molten condition, but is brought up from what may be termed the barysphere, from some unknown depth when it came into contact with the water (which only penetrates the earth for a short distance) but which must be in a very heated state, and containing all the elements necessary to put metals in solution. This solution would be forced up through every seam and fissure, and also through all permeable rocks; but the natural result of this would be, that there would always be a great tendency for the caps of the lodes to be richer in minerals than lower down, as the force or pressure from below would tend to force the liquid up until it met with the colder waters above, or until it was in that state when a precipitant would act quickly upon it to deposit the metals in the condition in which they are found. On the other hand, the secondary deposits, formed from a decomposition of the original rocks, or from the solubility of them, whether we have descending currents or lateral secretions, the same thing applies as to the ascending solutions. The precipitating power appears to be greater nearer the cap of the lode, or, at least, within a few hundred feet of the surface. Whatever metals are held in solution in the country-rock than they are within a reasonable distance of the surface; but whatever limit this distance may be, it certainly has not yet been determined, and it becomes a question whether the temperature of the earth has not a great deal to do with this. If we take the average increase of heat in the earth, which is 1° for every 60ft. in depth, and taking the surface temperature at 55°, we should only have to go down to a depth of 33,420ft., or six miles and a third, when a temperature will be reached which would melt lead, and, therefore, at that depth water cannot exist except in a gaseous condition. All solutions come from comparatively a shallow depth, and the inference is that the less soluble the metal, and the more difficult to precipitate, the nearer it will come to the surface before it is deposited in a metallic condition.

The question as to how our lodes are formed is of the utmost importance to the miner, and all information regarding the formation of ore-deposits should be carefully watched to see in what direction we may look for a solution of the problem: whether volcanic dykes have any influence on the richness or otherwise of our lodes, or whether the decomposition of eruptive rocks affects them in any way. If we look at the Thames, the lodes are formed in a decomposed rhyolitic substance brought together and deposited by water, or under water. And on this field there are numerous dykes of more recent volcanic origin. We know that extraordinary rich patches of auriferous ore have been, and are still being obtained from the mines in this locality, and my impression is that these volcanic dykes have an important bearing on the matter.

Professor F. Posepney, of Vienna, at the International Engineering Congress at Chicago, last year, read a valuable paper on the "Genesis of Ore-deposits"; and the remarks therein, and the theories set out, should be largely circulated amongst mining men to get them to assist in supplying any additional knowledge on the subject that may present itself in carrying on fresh explorations. The paper is too lengthy for me to quote in full, but extracts from a summary of it will be interesting to those engaged in mining pursuits. It is divided into two parts, and published as a copyright, in the "Transactions of the American Institution of Mining Engineers," New York.

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