

THE COBALT MINING DISTRICT.

BY DR. ROBERT BELL, F.R.S., Ottawa, Ont.

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In the present paper the writer proposes to confine his remarks mainly to some points in connection with the geology of the Cobalt district and the nature of the metalliferous deposits, the most important of which are those of silver.

The silver-bearing area is comparatively small, the most productive portion, so far as known, not exceeding about fifteen square miles, although fresh discoveries are being made, some of which tend to increase the area. The general appearance and the physical characters of this area are similar to those of the region which surrounds it for many miles. It is an undulating, rocky, forest-clad district, with numerous small lakes among the hills, which latter are not high or conspicuous, the general aspect, on the large scale, being that of a mam-millated peneplane.

The centre of the productive area is about three and a half miles west of Lake Temiskaming, in latitude 47 degrees 30 minutes. The rocks within the above fifteen square miles belong to the series, all of which was formerly called Huronian.

A few words of explanation may here be advisable in reference to the history of the Huronian system, and the evolution and nomenclature of the divisions which are now more or less recognized by geologists. It is well known that some sixty year sago the whole of the upper series of the azoic or archæan was called Huronian. This was before discovery had advanced sufficiently or geologists had had time to properly classify and sub-divide the great series of crystalline rocks overlying the Laurentian, which Logan and Murray had already found in the region of Lakes Huron and Superior.

It required much time and labor to ascertain the general nature, the importance, the geographical extent and distribution, the volume and the probable natural divisions of the system. While the whole series may be described as of a pyro-clastic type, an igneous character prevails towards the base and the sedimentaries become more and more abundant and diversified towards the top. The underlying igneous type has been called the Keewatin division, while the term Huronian has always been applied to the higher portions, and this may be again separated into the lower and upper Huronian, although no continuous dividing line has been established.

One of the characteristics of the Huronian proper is the want of continuity of any particular belt or division. The lithological divisions which may exist in one district all thin out and terminate in both directions, and gradually become interlocked or dovetailed with new formations which gradually introduce themselves from both sides. In other words, a general cross section of the Huronian, covering a considerable distance, would show a series of interlocking lenses of different rocks, which are gradually replaced on the strike by other kinds. For this reason an identity or difference in any set of these rocks in widely separated localities is no criterion as to a similarity or a difference in age.

The recognized Keewatin rocks of the Lake of the Woods lie at a distance of seven hundred and fifty miles in a straight line from the Cobalt district, and the two formations have not yet been separated from each other in any part of the intervening distance, in the course of which the Huronian areas are broken up and separated

by wide intervals of the Laurentian. Too much stress, therefore, should not be laid on differences of age which are supposed to exist among the rocks of the Cobalt district. It may be better to defer an exact separation and classification until some general work in this line has been done over this great interval and until this whole subject is better understood. It is worthy of notice that some persons who make frequent use of the word Keewatin apparently believe that it is a lithological term, like conglomerate, diorite, slate, etc., and could point out where a few yards of it might be seen. The writer should here observe that he has done no work personally in the way of mapping out and classifying the rocks of this district, and as the geologists who have been engaged upon it do not agree, it might be better for the present to confine our geology to making as correct a petrographic map as possible, which is all the prospector or the miner requires, and leaves the classification to be determined later on.

The silver-bearing rocks have so far been found to consist of massive or crystalline diabase, but more especially of a volcanic breccia or agglomerate having a bluish and grayish matrix consisting of hornblende porphyrite, while the contained fragments are mostly reddish and grayish granite, together with others of the porphyrite itself and various forms of greenstones. The fragments are generally of rather small size, and mostly angular or subangular, although in some parts many of them are more or less rounded. They stand at all angles in the mass and are very irregularly distributed; sometimes well scattered throughout considerable volumes of the rock, sometimes occurring in large and small bunches or "flocks," or they may be sparingly distributed or almost entirely absent. This agglomerate has a general horizontal attitude and is the rock which is most in evidence at the surface in the more productive parts of the district. Associated with the two kinds of rocks which have been mentioned are fine-grained drab and gray slaty rocks and dark and light colored greywacke, passing into impure quartzite. These also lie horizontally or conformably with the great sheet of brecciated hornblende porphyrite.

In the Cobalt district itself, the brecciated rock extends beyond the silver-bearing area and the same breccia occurs abundantly on Lake Temagami, around Rabbit Lake, and in other parts of the region, but holding little or no silver, as far as known. The presence of the silver at Cobalt would therefore appear to depend upon an original local impregnation of the parent breccia and diabase with the metal. It would therefore appear to be a mistake to suppose that silver is to be looked for wherever the breccia is found. The occurrence of the silver in the Cobalt district appears to be regional and to be confined (with some exceptions) to a comparatively small area. This is not the only example we have of these local occurrences of a certain metal. The great abundance in this same locality of the hitherto rare and expensive metal, cobalt, affords another example of this phenomenon. The immense deposits of nickel, within a very limited area at Sudbury and in New Caledonia on the opposite side of the planet, belong to this mode of occurrence. In various parts of the world, some of the other metals, such as tin, mercury, platinum and manganese, exhibit the same tendency to regional limita-