

a tunnel along the vein into the cliff which rises a short distance to the south-eastward of the shaft. The other cross vein outcrops on the flat top of the hill at about 200 yards to the southwestward of the last. Here the earth has been removed so as to expose the glaciated surface of the agglomerate. In one part of the smoothed surface, the vein shows itself as a reticulated shining streak of polished silver and rock, three or four inches wide. A neighbouring part of this vein has been opened and a considerable quantity of rich ore removed.

The silver-bearing veins of the agglomerate throughout the district are themselves small, but since much of the ore is derived from the branch veins and the country rock adjoining them, they are more important than might be supposed at first sight. The gangue consists of calcite, derived from the agglomerate, with rarely a little quartz. The vein-matter is generally much split up, fractured, faulted and brecciated and many miniature horses are included. Branches are sent off, which often follow the secondary dislocations accompanying the main disturbance that caused the vein. Yet there is usually a continuity of productiveness along the general plane of fracture. On either side of this broken-up and interrupted plane the wall-rock on either side may contain much native silver in the form of plates, sheets and leaves, filling small fissures or gashes.

The values are mostly in the silver, all the other ores being worth comparatively little. From the information I could gather as to the output of the different mines, the total value of the silver produced in the district, from the time the first openings were made until the beginning of April of the present year, amounts to upwards of \$1,500,000 and it may approach, but does not exceed, \$2,000,000.

The following twelve metals have been found in the veins above described:—Silver, cobalt, nickel, copper, lead, arsenic, antimony, bismuth, iron, manganese, zinc and, lastly, gold in small quantity in one or two instances. Most of these metals have here entered into numerous combinations, among themselves and with sulphur and oxygen, to form a variety of somewhat uncommon mineral species.

The presence of such a number of different metals is a hopeful sign and one of the proofs that the containing rocks are essentially of igneous origin, notwithstanding the local modification of parts of them by water.

For convenience, I use the word "mine" in the same sense as do the prospectors of Cobalt, namely, to indicate any artificial opening in the rock, such as a shaft, an open cut, etc., instead of restricting it to its true meaning.

The silver and the ores of the other metals usually occur irregularly in bunches or scattered through the calcite and also through the country rock between the small veins of the groups, as well as for some distance inward from the walls. Most

of the metallic silver is found in flat plates with extremely ragged and irregular edges, which, judging from a parcel of 150 or 200 pounds in the office of the Nipissing Mining Company, will weigh, on an average, from one-quarter to one-half pound each. In the open cut, called No. 26, on this company's property, I saw, at a depth of 30 feet, a vein of coarse crystallized calcite 4 inches wide, thickly studded with bright silver to the extent of fully 20 per cent. of its weight. Only 4 feet in height as rich as this was exposed, but it passed into the rock below maintaining its width and value. A specimen of this vein weighing 130 pounds was taken to the company's office. Specimens of pure silver, weighing from a few pounds up to twenty or more, have been obtained in a number of the mines and several pieces rich enough to be called "nuggets" have been found. A piece of rich ore, 5 inches thick and weighing 258 pounds, was found in the surface debris lying upon the outcrop of the Larose vein on the west side of the shaft. It originally formed a part of the full width of one "rib" of the vein and has a somewhat laminated structure, the layers being composed of smaltite, niccolite, native silver and calcite. This specimen was purchased for the Museum of the Geological Survey and, in order to ascertain the value of its silver content, five holes were bored through it. The drillings from these, on analyses, were found to contain about 18 per cent. of silver. The high specific gravity of the smaltite and niccolite gave rise to a belief that this "nugget" might contain a larger percentage of silver. A mass of calcite and silver, said to weigh about 700 pounds, taken out of the Larose mine, was described as being so strongly held together by the silver as to require the use of cold chisels to cut it into pieces of convenient size to ship. "Nuggets" of mixed silver and calcite, weighing upwards of 100 pounds, are exhibited in the banks at Cobalt and in some of the mining companies' offices in the district.

As a striking example of the numbers of heavy pieces of native silver which may be picked out of the ore after it has passed through the crusher, I may mention that Mr. W. H. Linney, Superintendent for the Nipissing Mining Company, informed me that last year he had made a shipment to Mr. Ellis P. Earle, 31 Nassau street, New York, one of the partners in this company, of a petroleum cask containing 3,977 ounces of metallic silver and a large mass of niccolite with native silver protruding from it on all sides, and which was afterwards found to contain 780 ounces of this metal. The value of all, at 60 cents per ounce, was \$2,854. At the offices of nearly all the mines in the district, the visitor is shown numbers of heavy pieces of native silver taken out of the respective mines.

The concentration of the silver in the metallic form near the present surface or at a moderate depth has no doubt been due to a chemical or elec-