

some pyrite may be added. Feldspar, which is commonly oligoclase-albite, either lath-like or irregular in shape, is entirely recrystallized into a fresh, clear, granular albite, with possibly a slight increase in soda content. Chlorite disappears entirely; 10 to 15 per cent of sericite is formed, and calcite, commonly forming 10 to 20 per cent of the original rock, is increased in amount to 40 or 50 per cent. Nearer the central vein, under the more intensive action of the solutions, further changes take place. Albite and sericite tend to disappear entirely; a great addition of pyrite occurs, and the calcite content increases enormously and may replace everything but the pyrite. A little quartz is sometimes present, but always in vague, vein-like forms, and not a part of the true replacement. The pegmatite of the central vein itself also has very commonly suffered a partial alteration, in a replacement of a part of its feldspar by calcite.

The composition of the solutions which deposited the ores may be inferred from the results of their action on the country rocks. They were evidently rich in sulphur, and also carried iron. Considerable carbon dioxide was present, and the lime content was high. They carried potash and soda, but probably only in small amount. They dissolved out and removed silica, alumina, and magnesia primarily; potash and soda were also carried away where the reaction was more intense, nearer the central veins.

Summary and Conclusions.

The internal structure of the ore-bodies, consisting of a pegmatite vein at the centre, a middle zone of mineralized and altered rock, on each side, and an outer zone of altered rock without mineralization, which grades into unaltered country rock with irregular and embayed contacts, is clear evidence that the deposits in schist have been formed by the alteration and mineralization of the country rock by solutions coming up along the central vein. The partial calcitization of the feldspar of the pegmatite indicates a change in the character of the solutions during the formation of the ore-bodies.

The serial composition of the various veins of pegmatite, varying from veins of pure quartz up through pegmatites of increasing feldspar content, to dykes of pure porphyry, indicates an igneous origin for all.

The satellitic arrangement of the veins, in that with few exceptions they are grouped within an area bounded by a line drawn about 1,000 feet from the edge of the porphyry mass, with the major number within 500 feet, points conclusively to their genetic connexion with the porphyry intrusive.

Veins or dykes approaching the porphyry in composition deposited little or no gold, but did in places deposit pyrite. They had no strong alterative action on the wall rocks. Pegmatites deposited auriferous pyrite, and had a powerful alterative action on the wall rocks. Quartz veins had little action on the wall rocks, and deposited little or no pyrite. Other things being equal a rough proportion exists between the size of the vein and the size of the altered zone around it.

It is concluded, therefore, that the schist ores of Matachewan district were deposited by juvenile solutions originating as the last products of the differentiation of masses of intrusive granite porphyry. The solutions were at first rich in silica, soda, and alumina, which crystallized