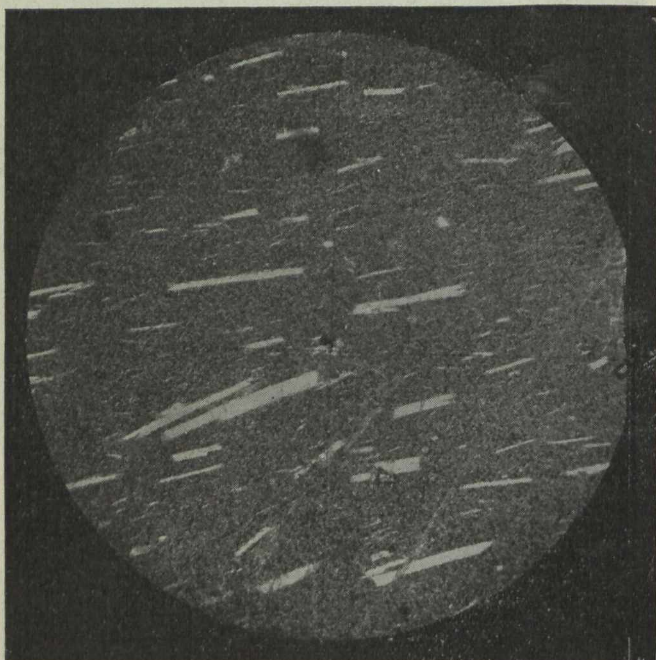
are highly altered, so that the species cannot be definitely determined. The ground mass shows a more or less isotropic residue.

Conclusions From Observations.

Every indication points to the conclusion that the gold and the tellurides were the first of the metallics to find a place in the ore deposits. They are very closely associated and bear evidence of contemporaneous origin. Pyrite, appearing at several stages in



No. 11 x42

the history of the deposits, had its initial introduction immediately after the gold and tellurides. Frequently the gold and tellurides are found encased in pyrite crystals (Photo No. 1). This is rather a departure from the usual order of occurrence as usually the gold deposition is induced by the pyrite.† This is the case in the Porcupine District where gold is often found as a coating, on the faces of pyrite crystals.

Although very little native gold is found in actual contact with the pyrite in the Kirkland Lake District, it being nearly always found with the tellurides, or in isolated particles, yet it is a very interesting fact that wherever pyrite is found in the "impregnated zone," gold is found also, and "the smaller the pyrite crystals, the higher the assay." This rule holds good also for the type of deposit within the porphyry.

Next in succession comes pyrargyrite and molybdenite, so closely associated and bearing so similar relationship to the minerals already deposited that it is difficult to determine their respective order. In the sections examined pyrargyrite appeared to be more abundant than the molybdenite. Both being in a very fine state of division, the hand specimen is apt to be misleading, giving the whole the aspect of being impregnated with molybdenite. It was commonly supposed that molybdenite acted as a precipitant of the gold, and its presence therefore was invariably regarded with favor, but the order of succession above outlined does not bear out this supposition.

With subsequent shearing and fracturing of the deposit, due to strains caused by certain movements, quartz and sometimes calcite was later introduced into the many almost microscopic as well as the larger fractures.

Photomicrograph No. 6, shows what resembles pyrite replacing calcite. This occurs in a crushed zone, and calcite filled in the voids in the breccia. Evidently, later solutions carrying pyrite replaced the calcite, showing a still later introduction of pyrite. No trace of gold or silver bearing minerals or molybdenite were found associated with this introduction. Again calcite and pyrite appear together (Photo No. 4) and pyrite appears as a primary mineral in the porphyry (Photo No. 7).

There are many indications that certain post-Temiskaming porphyry intrusives are genetically related to the ore deposits as outlined previously.*

There appears substantial proof that there are at least, three different ages of porphyry in the district. On the Burnside property a dense porphyritic intrusive with feldspar crystallites (Photo No. 11) cuts the chilled felsitic facies of the reddish porphyry. This shows clearly two ages, both post-Temiskaming. Then again many of the pebbles in the uptilted Temiskaming conglomerate are typical feldspar porphyry pebbles, identical with pre-Temiskaming feldspar porphyries exposed in the Kirkland Lake District.

Mr. Tyrrell apparently assumes that the porphyries are all of the same age, and correlates them as pre-Temiskaming. He concludes that they, being separated from the Temiskaming series by an erosion unconformity, can have no genetic connection with the ore deposits within the sediments. In part he is correct. The pre-Temiskaming porphyry is not genetically related to the ore deposits, but he overlooks the fact that the post-Temiskaming porphyries are intruded into the Temiskaming series, and not faulted contacts.**

What relationship does he establish between the porphyry and the ore deposits within the porphyry? The older of the two post-Temiskaming porphyritic intrusives, from evidence gathered from the field, is genetically related to the ore deposits in the Temiskaming series as well as to those within the post-Temiskaming porphyry itself.‡

Several thin sections from the principal ore deposits of the Porcupine District, kindly loaned the writer by Mr. Tyrrell, show a feldspar porphyry which is identical with the Kirkland Lake acid porphyries. Some thin sections showed a few quartz phenocrysts, and on the whole the porphyry may be said to be slightly more acidic than the Kirkland Lake porphyry. Many of the feldspar phenocrysts show the resorption phenomenon in a marked degree, and some showed the flow structure and still others showed fracturing of the feldspar phenocrysts. All the sections examined displayed an abundance of the usual secondary decomposition products. It would be interesting to know whether or not this porphyry bears any genetic relation to the Porcupine ore deposits. The presence of acid porphyries in connection with gold deposits is widespread and worthy of note and opens a broad field for investigation.

†—T. A. Rickard, The Indicator Vein, Ballarat, Australia, T. A. I. M. E., Aug., 1900.

*—"Discussion of Ore Deposits and Geology of Kirkland Lake," by A. G. Burrows, Ibid, April 1, 1914, p. 235; also "Ore Deposits of Kirkland Lake District," by C. Spearman, Ibid, Oct. 1, 1913, p. 600.

**—"Occurrence of Gold in Northern Ontario," by J. B. Tyrrell, Nov. 20, 1913; Inst. Mining and Metallurgy.

‡—"Ore Deposits of Kirkland Lake District," by Chas. Spearman, Ibid, Oct. 1, 1913, pp. 599-601.