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A Mineralographic Study of Ore Specimens

from

Island Mountain Mine, B. C.

by

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Introduction

The properties of Island Mountain Mines Company Limited consist of two groups: firstly, thirty-two claims and fractions containing approximately 1027 acres on Island Mountain, along the north shore of Jack of Clubs Lake, four miles northwest of the town of Barkerville; and secondly, fifteen claims and fractions containing approximately 583 acres on Proserpine Mountain, two miles south of Barkerville. The company was founded in October, 1933. No work has been done on the Proserpine Mountain group since 1935.

General geology of the Cariboo district

The Cariboo district is underlain by great thicknesses of sedimentary rocks, certain areas containing volcanic and intrusive rocks as well. These rocks are divided into three main groups: the Cariboo series, at least the greater part of which is late Precambrian in age, the Slide Mountain series of late Paleozoic age; and the Quesnel River group of Mesozoic age. The Cariboo series has been arched into a broad anticlinal structure whose axis extends northwesterly, lying about midway between Stanley and Barkerville and crossing Cariboo lake. At each side of the anticlinorium are broad synclinal structures containing erosional remnants of the younger strata, the northeasterly one being occupied by the Slide Mountain series and the southwesterly containing the Quesnel River group.

In the vicinity of Barkerville, Uglow divided the Cariboo series into three conformable formations which he termed the Richfield, Barkerville, and Pleasant Valley. The Richfield which was estimated to be at least 8,000 feet thick, is the oldest and thickest of these formations and it contains practically all the lode deposits so far discovered in the district. It consists essentially of impure quartzose sediments ranging from quartz-mica schists to massive quartzites, with numerous interbeds of limestone and argillite and minor amounts of pure quartzite, graphite schist, carbonate schist, tuff, and conglomerate.

The lode deposits are of 2 fundamentally different types: vein and replacements. The latter consists of limestone beds and lenses replaced by massive and disseminated gold-bearing pyrite, which is accompanied at a few places by a little chalcopyrite, galena, and scheelite.

The veins differ greatly in size, shape, strike, and mineralization. They are far more numerous than the replacements. Hanson classified the veins as follows:

1. Transverse veins, striking northeast.
2. Diagonal veins, striking east.
3. Strike fault veins.
4. Bed veins - lenticular and as yet uncommercial.

Deposits at Island Mountain

Quartz veins

There are two series of quartz veins, apparently of the same age. The diagonals strike northeast 65 to 75 degrees and dip 80 to 90 degrees south. Occasionally the dip is to the north. The 'horsetails' strike roughly northeast 45 degrees and dip 40 to 70 degrees southeast.

The 'diagonals' are few in number compared with the 'horsetails', but the former are much the more persistent and usually make ore. Their width commonly varies from 2 to 6 feet and in infrequent instances reaches 12 feet. The longest diagonal which makes ore is 250 feet in length and follows a continuous fracture. Most 'diagonals' have some 'horsetails' joining them, and the junction is usually a point of heavy mineralization. The 'horsetails' are usually 1 to 6 inches in width, sometimes heavily mineralized with pyrite, but more often barren or nearly so.

The ore veins (quartz) contain 10 to 15 percent pyrite which carries from 0.2 to 3.0 or more ounces of gold per ton and negligible amounts of galena, sphalerite, arsenopyrite, chalcopyrite, and scheelite.

Pyrite replacement in limestone

In these deposits, the gold-bearing pyrite replaces white crystalline limestone. The limestone varies in width from 1 to 30 feet, the greater widths probably being the result of folding. The beds of limestone, as well as the lenses of pyrite in the beds, plunge downward westerly at an angle of about 30 degrees in the plane of the bedding.

The replacement may be found anywhere in the limestone bed; on the footwall at the contact with quartzites, part way into the limestone bed, or on the hangingwall of the limestone at the contact with altered sill rocks.

With the limestone are interbedded argillites varying in colour from pale yellow to dark green. The argillites, in bands of 1/16-inch to a foot or more, may occupy from 1 to 50 per cent of the beds, but only the limestone will carry pyrite replacement.

An essential condition for the formation of ore lenses is the presence of numerous 'horsetail' fractures in the adjoining rocks. It seems probable that these were the avenues by which the mineralizing solutions entered the limestone. These fractures are usually 1/2 to 2 inches in width, sometimes containing a high percentage of pyrite and sometimes only barren quartz.

Description of ore specimens

Specimens of ore were mounted in dammar gum, polished, and studied with the view of determining the minerals present, the occurrence and association of the gold, and the paragenesis.

The ore minerals found in order of their abundance were pyrite, galena, arsenopyrite, and native gold.

The gangue consists mainly of quartz with a minor amount of carbonate, chiefly calcite.

Specimen No. 1 - Sulphide ore. Pyrite, quartz, and calcite. The quartz and calcite fill fractures in the pyrite.

Specimen No. 2 - Quartz ore. Pyrite, arsenopyrite, galena, native gold, and quartz. The pyrite and arsenopyrite are intergrown. The galena and gold fill fractures in the pyrite.

Specimen No. 3 - Sulphide ore. Pyrite, galena, gold, quartz, and calcite. The galena and a relative abundance of gold occur in fractures in the pyrite.

Specimen No. 4 - Quartz ore. Pyrite, quartz.

Specimen No. 5 - Quartz ore. Pyrite, quartz.

Specimen No. 6 - Sulphide ore. Pyrite, quartz, and calcite.

Pyrite is the principal ore mineral, occurring mainly in small cubes up to .2 inches on a side imbedded in the gangue. In places it is crushed and highly fractured.

Arsenopyrite is very scarce and where found is intergrown with pyrite. It has not been crushed and fractured to the same extent as the pyrite.

Galena is found filling fractures in the pyrite. It often shows an excellent cubic cleavage as revealed by numerous triangular pits.

Native gold was found in both the 'sulphide ore' and the 'quartz ore'. It occurs in fractures in the pyrite and as irregular masses intimately associated with the galena. The largest piece of gold found had a diameter of 30 microns. All particles believed to be gold were carefully tested with $HgCl_2$ to make sure they were not electrum.

The quartz and calcite occur filling the fractures in the pyrite (Fig. 4). The quartz is highly shattered in some places while in others it shows rounded outlines which may be the result of abrasion due to the adjustment of stresses in the veins. The exact relationship between the quartz and calcite was not established but it is believed that the calcite was deposited at a later stage. It is further believed that neither gangue mineral influenced more than the other the deposition of the gold.

Paragenesis

1. Pyrite.
   Fracturing.
2. Arsenopyrite.
3. Quartz.
   Fracturing.
4. Galena and gold.
5. Calcite.

Pyrite was the first mineral to crystallize as it occurs in idiomorphic crystals and is the only mineral that is fractured to any extent. The pyrite and arsenopyrite occur intergrown (Fig. 3) but the latter is probably younger, being far less fractured. Quartz was the next mineral to be deposited, filling the fractures in the pyrite. It is probable that a minor amount of quartz cement was introduced much later, perhaps contemporaneously with the calcite. Following another period of fracturing, the galena and gold were deposited in fractures in the pyrite. (Figs. 1 and 2) The boundaries between these minerals are everywhere smooth so it is reasonable to assume that they were deposited contemporaneously. Neither gold nor galena was found in contact with arsenopyrite but, as there is no sign of fracturing in either of these minerals, it is probable that they were introduced at a later stage. As previously stated the relation of the calcite to the other minerals is not clearly understood but it may have crystallized at a late stage from residual solutions.

Conclusions

1. The gold occurs only in the native state.
2. Where the gold is in pyrite it occurs as a fissure vein type.
3. Where the gold is associated with galena, it occurs massively.

Acknowledgements

The writer wishes to express his appreciation of the enthusiastic cooperation given him by Dr. H. V. Warren and assistants.

Gold
Pyrite
Quartz
Galena

X 300

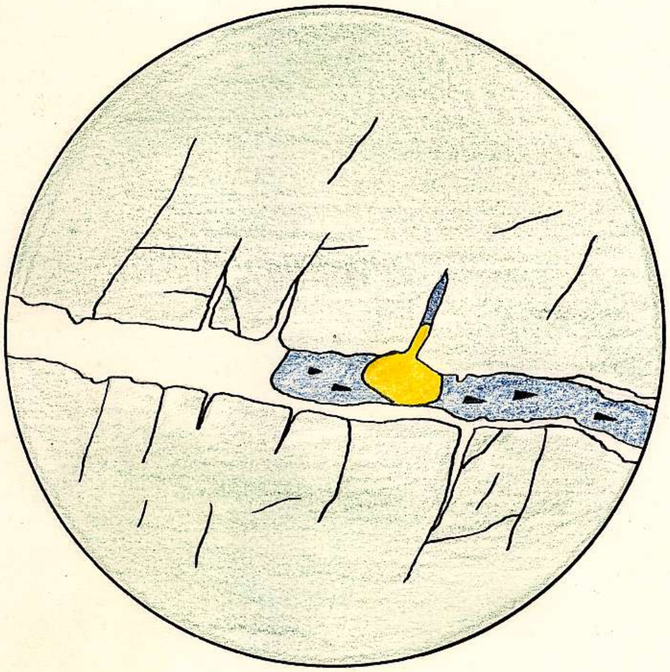

FIG. 1

X 300

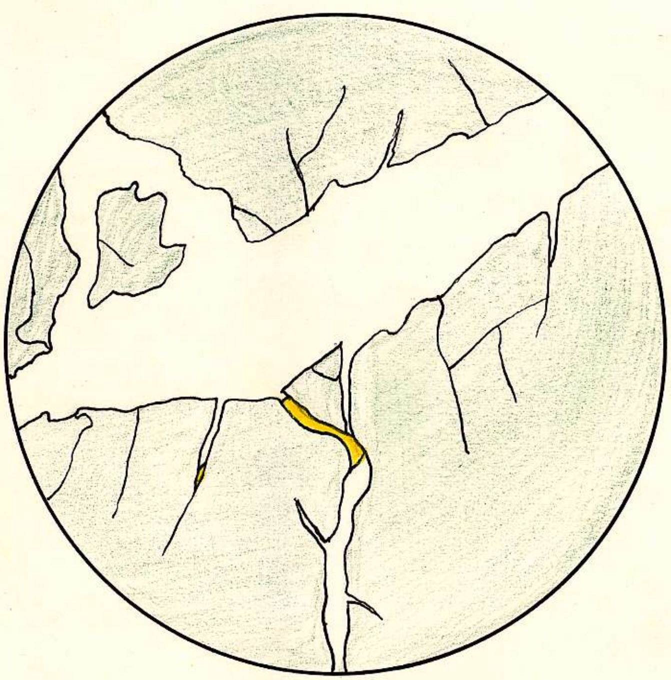

FIG. 2

Arsenopyrite
Calcite
Quartz
Pyrite

X 300

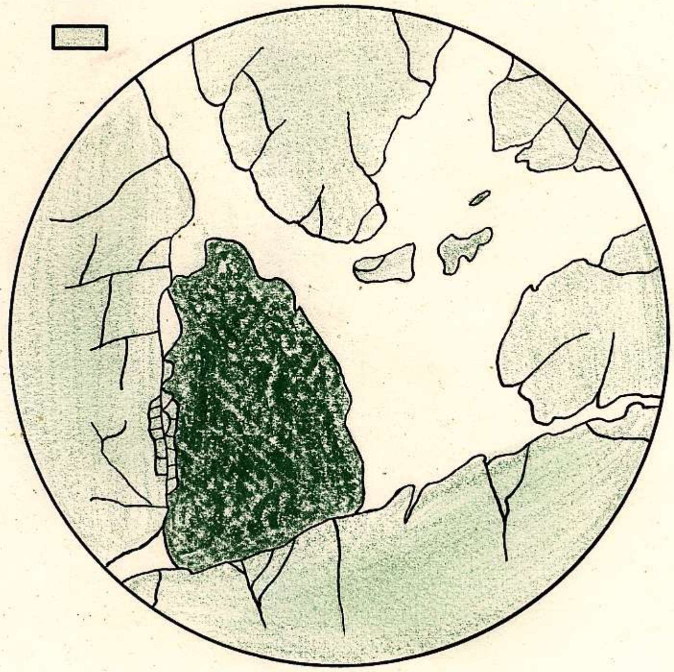

FIG. 3

X 60

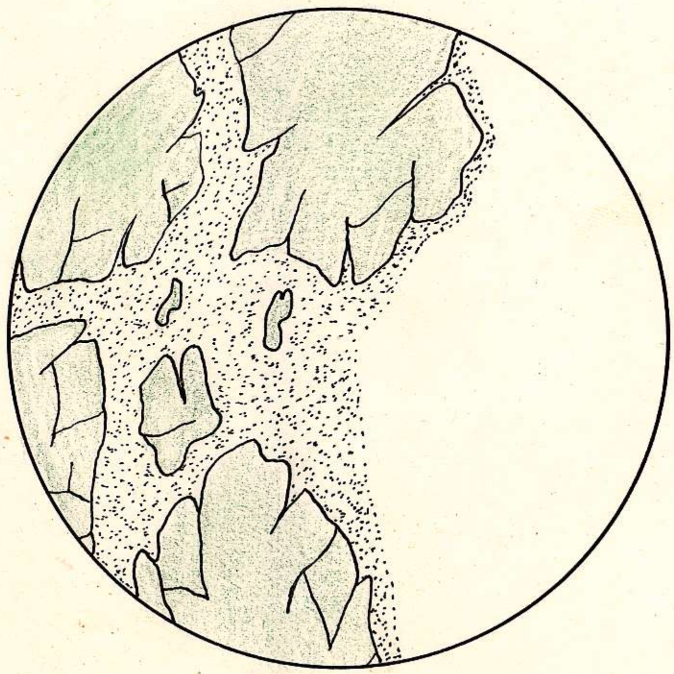

FIG. 4