GEOLOGY 409 REPORT

submitted by

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MINERALOGRAPHY

Department of Geology

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MINERALOGY

of the

ORECON MINING PROPERTY

Hedley, B. C.

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INTRODUCTION

This report is based on the mineralographic study of polished sections of ore specimens from the Oregon mining property, Hedley, B.C. A megascopic examination was made of the hand specimens and the gangue minerals were identified by this method. No thin sections were used.

The ore minerals were examined megascopically and in polished sections. The final identification and determination of the paragenetic relationship was made from polished sections. Except for the bismuth tellurides and safflorite no difficulty in identification was experienced. The former are identified only as bismuth tellurides because x-ray work was not used to find out which bismuth tellurides are present.

Polished sections had been prepared by previous workers on the mineralogy of the property and only re-polishing was necessary to prepare the sections. Several specimens from the Good Hope mining claim are included with the Oregon specimens and for purposes of identification and paragenesis are not treated independently.

LOCATION AND HISTORY

The Oregon group of eight claims lies about 4 miles south-east of Hedley and 1 mile east of the highway. The property is on the north-east side of the Similkameen Valley. Access to the property is gained by a road which branches off the Nickel Plate road. By road, the property is 8 miles from Hedley (see map).

The Oregon group consists of the Oregon, St. Bernard, Savage, Winchester and the Two Sisters claims and the Oregon and Winchester fractions. These claims were staked in 1904, and considerable development work, including 40 feet of tunneling was carried out in 1905. In 1950 the property was developed from 2 adits at an elevation of 3900 feet. The adits are 300 feet apart and are joined. Two stopes have been developed above the adit and mining was continued below the elevation of the adits. The property was put into production by the Kelowna Exploration Company Limited in 1950. Each winter from 1950 to 1955, the mine was closed. During its operation the ore was trucked to Hedley.

Production in 1955 was 3250 tons of ore. The ore yielded an average of .804 oz. of gold per ton from 1950 through 1955.

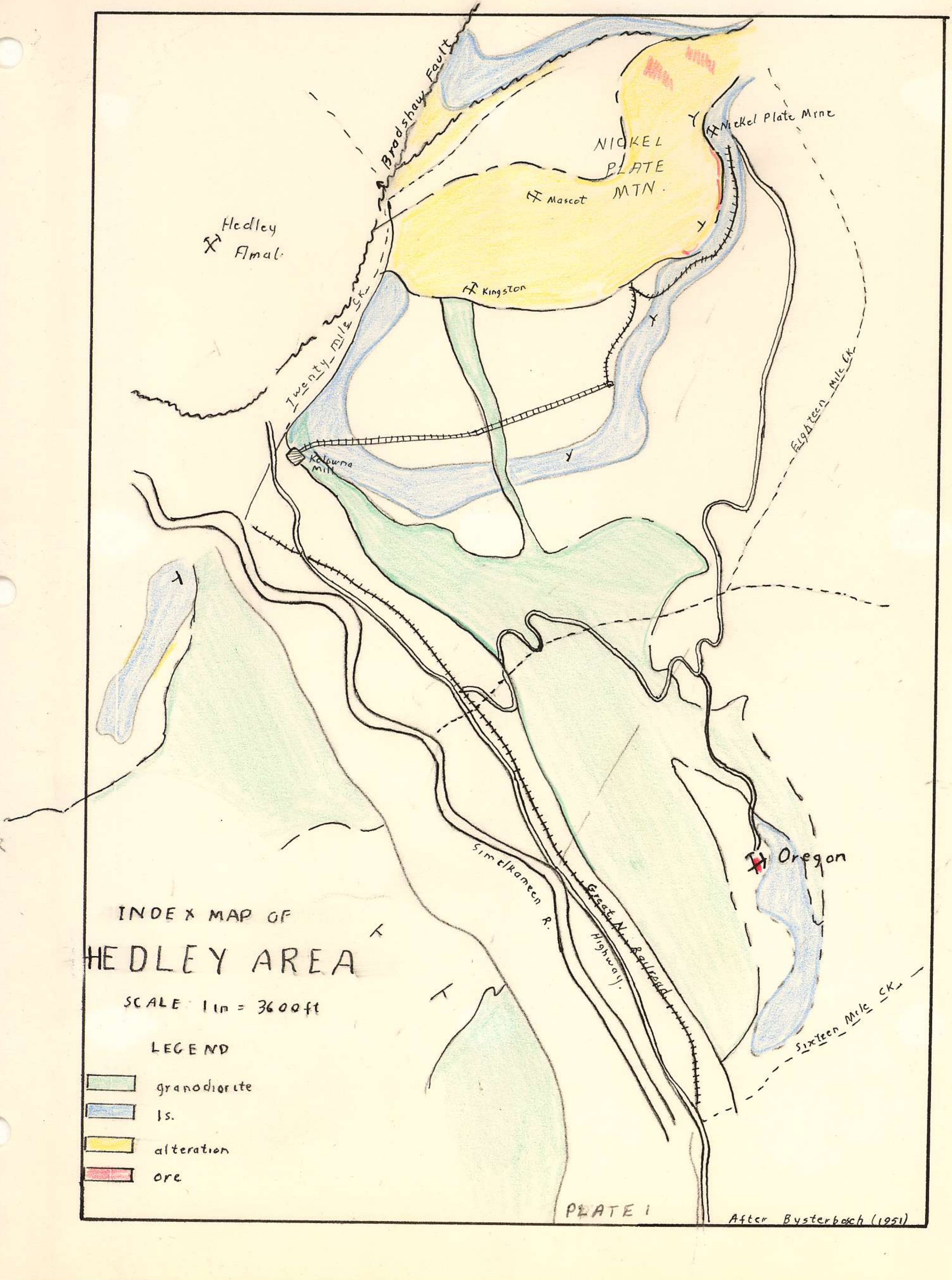


PLATE I

After Bysterbosch (1951)

GENERAL GEOLOGY

A tongue of the coast range intrusives cuts the rocks of the Nicola Group near the Oregon property (Rice 1947). The granodiorite of these intrusives was described by Camsell (1910) as a light gray rock of granitic composition and texture.

The rocks of the Oregon property are volcanics and sediments similar to the Redtop Formation of the Nicola Group. These rocks are silicious, thin bedded, argillites and volcanics interbedded with limestones (Camsell 1910).

The Oregon property lies in a re-entrant of the intrusives with the sediments. The sediments are locally folded and the mineralization occurs in a garnet skarn coincident with the bedding and at the gradational contact of the volcanics and limestone (Bysterbosch 1951)

MINERALOGY

GANGUE MINERALS

The ore minerals are found in a greenish colored skarn rock. Megascopic examination of the gangue minerals indicated the presence of garnets, calcite, quartz and feldspar. Bysterbosch (1951) concluded that the mineralization is closely associated with the alteration products of the rocks in which the minerals occur.

ORE MINERALS

Arsenopyrite

The arsenopyrite usually occurs as distinctive euhedral crystals easily recognized in the hand specimens. Many of the prism faces are strongly striated. The arsenopyrite seems to be the most abundant sulphide mineral and is often found closely associated with the siliceous zones of the skarn.

In polished section the arsenopyrite is recognized from the well developed crystal outlines, strong anisotropism and polerization colors of yellow brown and violet, hardness of F^+. Many of the crystals are fractured and these fractures are filled in some specimens by bismuth tellurides and rarely gold. Very little replacement has occurred along these fractures.

Traces of nickel in the arsenopyrite were indicated by microchemical tests but the test for cobalt was negative. ?

Bismuth -Tellurides

The most abundant ore minerals are the bismuth-tellurides. These minerals occurred as coarse foliated aggregates in quartz and closely associated with native bismuth, molybdenite and gold. They are distinguished in hand specimens by the brilliant metallic luster and perfect basal cleavage.

Polished section studies and microchemical tests indicate the presence of two bismuth-telluride minerals.

Mineral #1 (Joseite?)

This mineral is abundant and contains intergrowths of gold and exhibits smooth boundary relationship with native Bismuth and the other telluride mineral. It is identified by the white color, hardness A, black streak, good cleavage and moderate anisotropism. Etch tests were as follows : HNO_3 etches black with effervescence, HCL negative, KCN negative, $FeCl_3$ tarnishes grey, KOH & $HgCl_2$ negative.

Mineral #2 (Hedleyite)

The bismuth telluride with a slightly whiter color and which forms a smooth boundary with Joseite has been identified as Hedleyite. The color and property differences are so slight that except in one section where the minerals were found side by side the two minerals could not be distinguished. The etch reactions are identical.

Bismuth

Bismuth is found closely associated with the telluride minerals and molybdenite. In the polished section it is distinguished by the polysynthetic twinning, copper pink color, strong anisotropism, polarization colors yellow and pink, HNO_3 effervesces, HCl stains black, KCN, KOH, neg.

The polysynthetic twinning is described by Edwards (1947) as an indication that crystallization was well above the melting point, 217 degrees. The occurrance with molybdenite also indicates a high temperature of crystallization.

Pyrrhotite

Pyrrhotite was identified in only one polished section. In this section the mineral is recognized by the tan color, anisotropism and magnetism. Although found in only one section, the pyrrhotite is abundant in the section and closely associated with the arsenopyrite and molybdenite.

Smooth boundaries characterized the association of the pyrrhotite and arsenopyrite indicating probable simultaneous deposition.

Bornite

Bornite is abundant in most of the sections studied. In the hand specimens it is identified by the purple brown color, hardness of 3½ and test for copper.

In polished section the bornite has a distinctive pinkish brown color, is isotropic, hardness B. It is closely associated with chalcopyrite and exhibits a well developed exsolution texture with chalcopyrite being exsolved from the host mineral bornite. This exsolution texture would indicate a temperature of deposition of about 475 degrees C. Ref.?

Chalcopyrite

A megascropic examination reveals the chalcopyrite closely associated with bornite.

In thin section the chalcopyrite is exsolved from the host bornite along what cleavage directions. It is distinguished from the gold by the lack of sectility and association with the bornite. Very little chalcopyrite is found associated with any of the other minerals.

Covellite

This mineral is present in small amounts and found only along some fractures in bornite. It is identified by the blue color, pleochroism and red polarization colors.

Gold

Gold is abundant in the specimens examined and can be distinguish from chalcopyrite in the hand specimen and polished sections by the sectility. Small particles of free gold are disseminated throughout the gangue and as myrmeketic intergrowths in the bismuth-tellurides. In some cases the gold occurs in fractures in the arsenopyrite and as veinlets in the quartz.

Where the gold occurs as intergrowths and veinlets in the bismuth-tellurides it is limited to the outside edges of the telluride grains. This could indicate the replacement of the bismuth-telluride by the gold.

Free gold particles range in size from 20 microns to dendritic appearing masses up to 1.8 mm across.

Molybdenite

Molybdenite was indentified in the hand specimen by the softness and blue tinge. The mineral has a good basal cleavage.

In the polished section the mineral appeared as elongated and sometimes curved fragments with a good cleavage. The following properties were noted: color galena white, hardness B, anisotropic, polarization colors white, violet, and black, four extinctions per revolution, negative to all reagents.

The molybdenite is closely associated with the bismuth-tellurides and in one section it is found in arsenopyrite associated with gold but the gold does not cut the molybdenite.

Cobaltite

Cobaltite was observed in one polished section only. It was identified by the pinkish grey color, hardness and magnetism. The mineral is isotropic and etched as follows: HNO_3 , HCL, KCN, $FeCl_3$, KOH, and $HgCl_2$ neg. Identification was confirmed by microchemical tests. ?

The cobaltite occurred as small rounded grains in the gangue mineral and no cutting relationship with any other minerals was observed. Gold and arsenopyrite are seen in the same section but not intimately associated with the cobaltite.

Safflorite - loellingite

This mineral was seen only in the polished section associated with arsenopyrite. It is almost impossible to distinguish the mineral from arsenopyrite by color. Safflorite was identified by the hardness which is slightly less than arsenopyrite and by the presence of cobalt. A microchemical test proved cobalt, iron and arsenic. The arsenopyrite gave a negative test for cobalt. The safflorite occurred as slightly elongated grains in the arsenopyrite.

Outline?

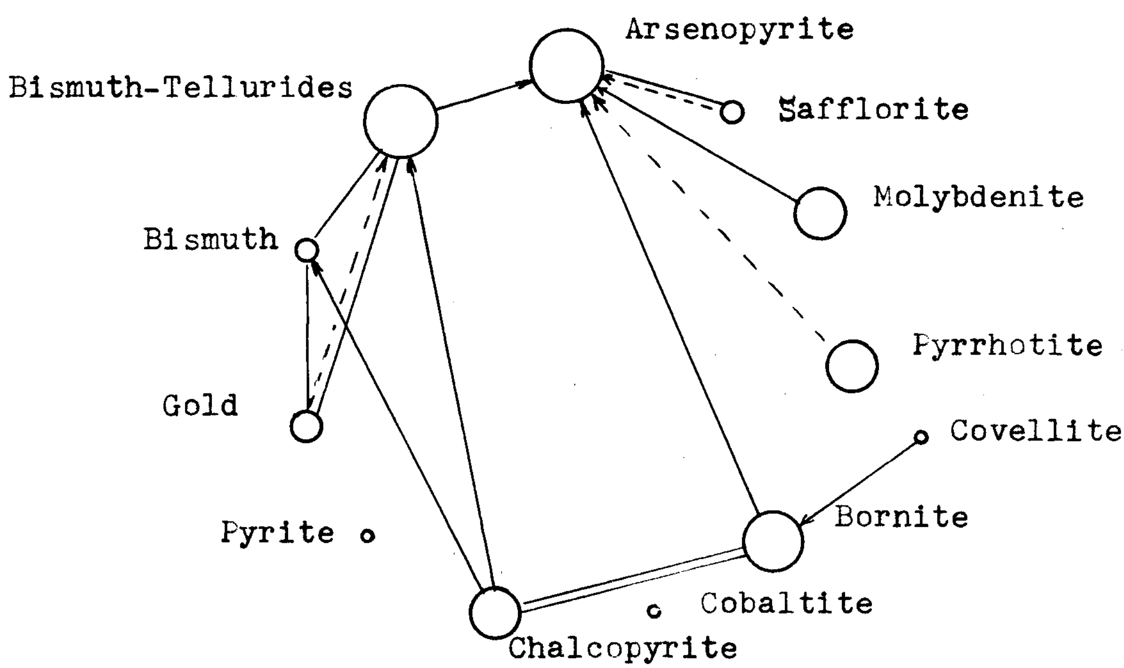
<u>Pyrite</u>

A few small grains of pyrite are present in the gangue of one of the sections. The pyrite is distinguished by the pale, brass-yellow color and hardness F. The pyrite was not intimately associated with the other minerals.

PARAGENESIS

Arsenopyrite is associated with most of the above minerals and was not observed to replace or cut any of these minerals. In the section where arsenopyrite was associated with pyrrhotite, smooth boundaries were observed. The grains of arsenopyrite in this section were rounded and possibly partly replaced by the pyrrhotite. From these observations it appears that the arsenopyrite probably formed first followed by pyrrhotite.

The bismuth-tellurides, bornite, molydenite, and safflorite replace the arsenopyrite and were therefore formed later. The chalcopyrite appears in exsolution textures in the bornite and therefore was formed simultaneously with the bornite. Gold was formed simultaneously with the tellurides and filled fractures in the sulphides. Bismuth formed at the same time as the tellurides as indicated by the smooth mutual boundaries. Covellite is secondary and formed at the expense of bornite.



CONCLUSIONS

The Oregon ore is a mineralized skarn deposit formed at an indicated temperature of greater than 450 degrees Centegrade. The proximity of the deposit to the intrusives and the character of the mineralization and gangue mineral indicate a contact metamorphic deposit of moderate to high temperatures.

Although some of the gold is associated with the arsenopyrite most of it occurs with the bismuth-tellurides. The absence of any large amount of pyrite is probably due to the presence of arsenic in the mineralizing fluids. The relationship of the bornite and the bismuth-tellurides is not clearly indicated because these minerals are seldom found together. Bornite and chalcopyrite were formed simultaneously with exsolution of chalcopyrite from bornite.

Pyrite is rare and not closely associated with the other minerals. It was probably deposited in the sediments before mineralization.

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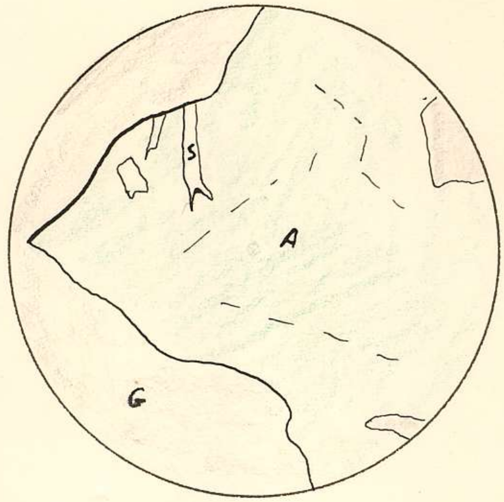
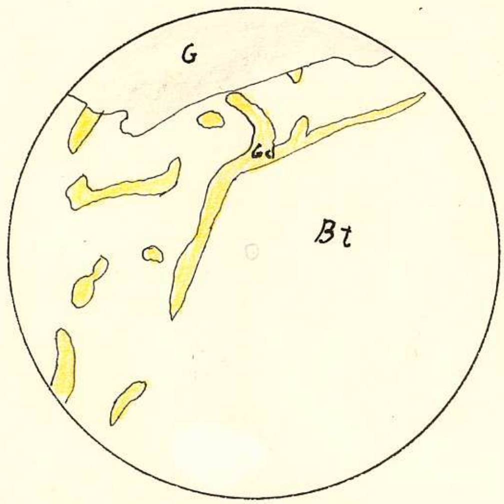


X 150

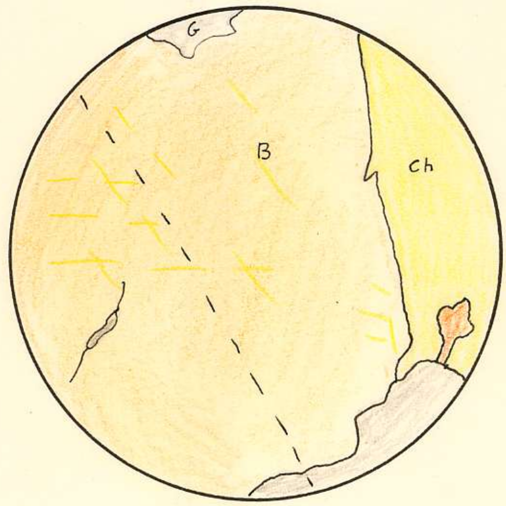
Safflorite (S) in Arsenopyrite (A)



X 380

Gold (Gd) in Bismuth- tellurides (Bt)

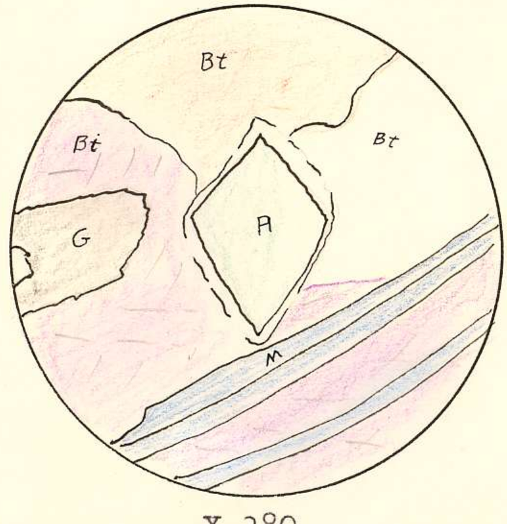
Plate 2 (Myrmekitic intergrowths)



X 380

Bornite(B) and Chalcopyrite (Ch)

Exsolution Texture

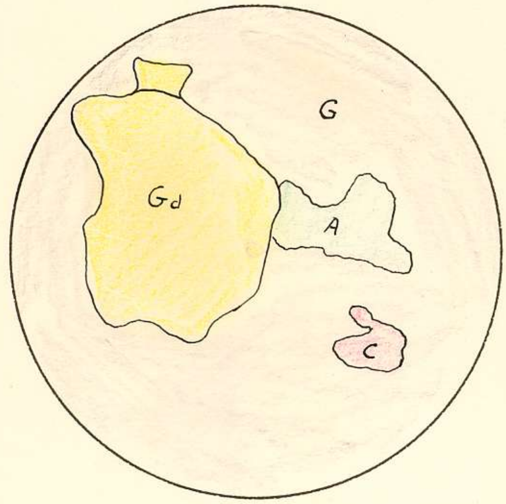


X 380

Bismuth- Tellurides replacing

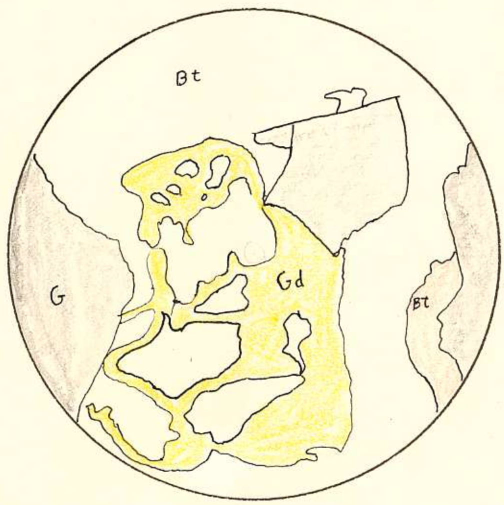
Arsenopyrite (Rim texture)

Plate 3



X 380

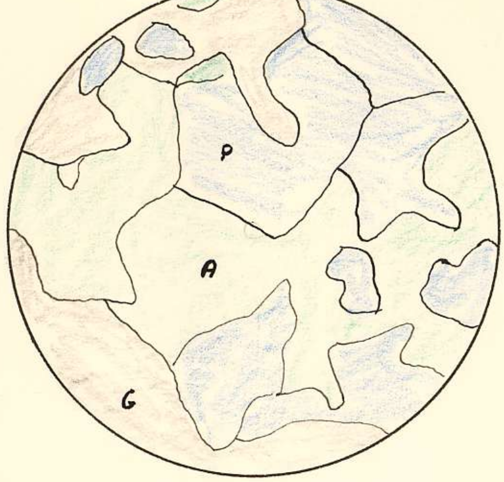
Gold, Arsenopyrite and Cobaltite (CO



X 380

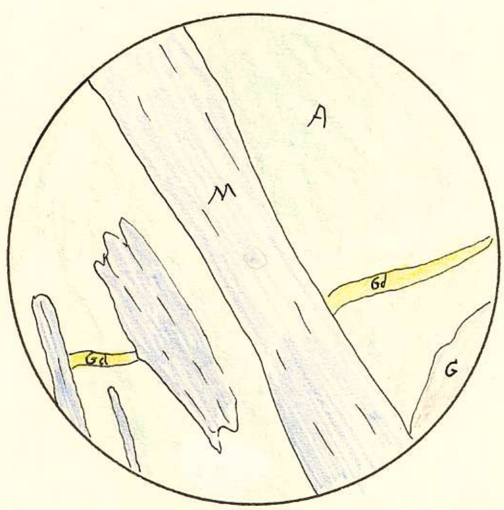
Gold, Bismuth- tellurides (Bt)

Plate 4



X 150

Pyrrhotite and Arsenopyrite (A)



X 150

Molybdenite (M), Gold (Gd), Arsenopyrite (A)

Plate 5