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MINERALOGRAPHIC REPORT ON CHIKAMIN MOUNTAIN MINERAL DEPOSITS

Lloyd D. Fenske

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University of British Columbia

Acknowledgements

I would like to thank Mr. C.V.Harrison, who made it possible for me to collect specimens from the various claims and also to Dr. S. Duffell, who made it possible for me to spend a few days in the area in order to look over the various claims.

I would also like to thank Dr. R.M. Thompson and Dr. H. V. Warren for the help given to me in collecting suitable specimens and also for the help given to me in doing the mineralogy of the Chikamin Mountain mineral deposits.

Conclusions

The minerals from this deposit were identified by microscopic and microchemical methods and were shown to be; arsenopyrite (FeAsS), pyrite (FeS_2), sphalerite(ZnS), galena (PbS), chalcopyrite($CuFeS_2$), tetrahedrite($3Cu_2S.Sb_2S_3$), pyrargyrite($3Ag_2S.Sb_2S_3$), gold, meneghinite($4PbS.Sb_2S_3$), bournonite($Cu_2S.2PbS.Sb_2S_3$), and canfieldite(?)($4Ag_2S.(SnGe)S_2$) all of which were associated with a quartz gangue.

Considering all the claims on Chikamin Mt., it appears that there were three surges of mineral deposition which were as follows:

1. arsenopyrite, pyrite
2. quartz gangue
3. chalcopyrite, sphalerite, galena, tetrahedrite, pyrargyrite, and assaciated minerals.

This seems to indicate that these minerals were being deposited as the ore bearing solution was becoming cooler.

According to Lindgren's classification of mineral deposits, this deposit is mesothermal which means that it formed between 175°-300°C.. From previous experience , these deposits usually persist to depth without any abrupt change in mineralogy. This type of deposit has well defined boundaries which is common for Chikamin Mt. deposits. The veins are typical fissure veins.

The two claims which seem to warrant further investigation are the Arsenic Group and the Upper Nickel. Although no gold was found in the polished sections from the Arsenic Group, assays show that there are 2 oz. gold per ton over a width of 2'. If continuity was proven, then this property may prove to be economical. The Upper Nickel has good showings of silver with minor gold and if suitable widths and continuity can be found, then this together with the Arsenic Group may form a commercial enterprise.

Any possibility of exploiting the deposit on Chikamin Mt. depends upon the precious metals found. The average width of the veins is 2' which is much too narrow for base metal mining. The reason why base metals cannot be profitably mined is because of transportation difficulties. Aside from transportation, other difficulties encountered, which would also apply to the gold and silver deposits, are lack of water, timber, electricity, mill and campsite and also weather conditions. Thus it is seen that at the present time it would not be profitable to mine the properties except perhaps for gold and silver which would have to be proven before work could proceed for the mining of these metals.

Mineralographic Report on Chikamin Mountain Mineral Deposits

Location:

Chikamin Mountain is approximately 70 miles southwest of Ootsa Lake P.O.. To reach Ootsa Lake, one can either travel by C.N.R. to Burns Lake and then travel by truck 50 miles south to Ootsa Lake, or else fly into Prince George by C.P.A., then take the C.N.R. to Burns Lake and hence to Ootsa Lake. From Ootsa Lake, the easiest way to reach Chikamin Mountain is by river boat up Ootsa Lake, Tahtsa River, Whitesail River, and then the Whitesail Lake. Chikamin Mt. is at the southwest end of Whitesail Lake on the southern shore. At certain times of the year the water in the Whitesail River is fairly low which makes transportation rather difficult.

Chikamin Mt. is about 7000' high and the lowest mineral showing is about 1700' above the lake at an elevation of 5300'. There are four showings of mineralization, a number of which have adits driven along their strike, The Upper Nickel and Ruby claims are on the north side of the mountain, and the Arsenic and Silver Belle claims are on the western side.

To reach the claims, a good trail winds its way up the north side of the mountain from Whitesail Lake to an old cabin which in an emergency would be liveable. About 900' above the cabin, the Ruby claim is found and another 700' above the Ruby is the Upper Nickel. There is no well defined trail leading from the cabin to these showings. The Arsenic Group and the Silver Belle occur on the western side of the mountain near the peak. There was a trail to these showings at one time but very little of it remains now.

General Geology:

The mineralization is found in fissures which cut across Hazelton group sediments. This sedimentary member is the lower sedimentary member in the Hazelton group. The rocks are chiefly grey bedded tuffs along with agglomerates and marine sediments. The beds strike 280° and dip 20°S. The fissures strike approximately 125° and dip from 85°E to vertical. The mineralization is probably due to the intrusion of the Coast Range Batholith which is found only a few miles to the west. Body of "granite" cuts through middle of the mtn.

Work on the Claims:

(i) Ruby Claim - An adit about 120' long is driven along the strike of the vein in a southerly direction. The maximum width of the vein is 24", consisting of alternating bands of chalcopyrite, galena and sphalerite and the bands vary in width from .25" to 1" . The adit is at an elevation of 5200'.

(ii) Upper Nickel - There is a very short adit about 12' long and 6' square. The mineralization is across a maximum width of 2' but usually is much less. The mineralization is much the

Skimps on information here.

same as the Ruby. This adit is at an elevation of 6000'.

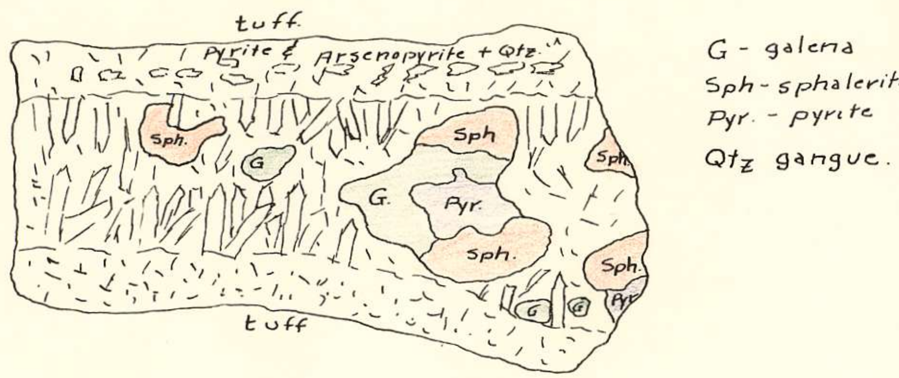
(iii) Arsenic Group - This group is located on the western side of the mountain and is at an elevation higher than the Upper Nickel. There has been some trenching done on the claim some time ago and now the outcrop is fairly well weathered. The width of the vein is about 2' and acicular arsenopyrite is very conspicuous in stringers about .25" wide.

(iv) Silver Belle - This is just a surface showing and it is said to have been trenched but at the time of examination was covered with snow. This showing is also on the western side of the mountain and is at a higher elevation than the Arsenic Group. He omits 1 showing with caved tunnel.

Determination of the Minerals and Paragenesis

(i) Ruby Claim

(a) Macroscopic Examination - This is best shown by a sketch of the specimen. In places the quartz occurs as crystals which show terminations.



(b) Microscopic Examination

Arsenopyrite - Diamond shaped cross sections; galena white color; hard; anisotropic with brown and violet colors; HNO_3

stained irridescent.

Pyrite - Mineral was hard; had a pale brass color; isotropic; negative to etch tests.

Galena - Soft; galena white color; numerous triangular pits; isotropic; tests showed it to be galena.

Sphalerite - Soft; isotropic; brown internal reflection; tests showed it to be sphalerite.

Chalcopyrite - Brass yellow color; did not etch with KCN; occured mostly as exsolution blebs in sphalerite.

(c) Paragenesis - There appears to be three periods of deposition which are as follows:

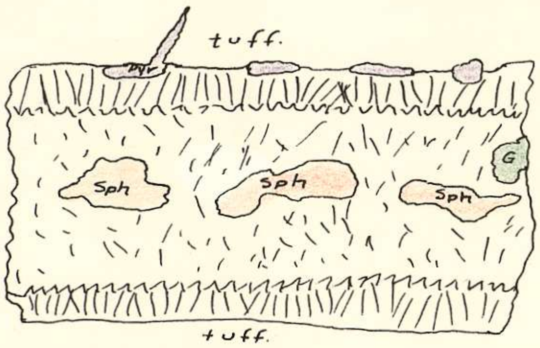
1. Arsenopyrite and pyrite. Gangue replaces both, galena and sphalerite replace arsenopyrite, and the pyrite and arsenopyrite appear to be contemporaneous.

2. Gangue. Galena appears to replace the gangue.

3. Galena and sphalerite. The contacts between these two minerals are such that they appear to be contemporaneous. Figures at the end of the report show typical relationships.

(ii) Upper Nickel

(a) Macroscopic Examination -.A typical specimen is shown in the sketch below. In some, chalcopyrite is present whereas in others either sphalerite or galena predominate.



(b) Microscopic Examination

Galena - Determined as before.

Sphalerite - Determined as before.

Chalcopyrite - Determined as before.

Pyrite - Determined as before.

Arsenopyrite - Determined as before.

Pyrargyrite - Soft; bluish grey color; anisotropic with colers of light and dark grey, and brownish green; ruby red internal reflection; etch and microchemical test showed it to be pyrargyrite.

Gold - Bright straw yellow color; sectile; isotropic; stains with KCN. Largest size was .12 mm..

Canfieldite (?) - This mineral had a brownish-pink coler; soft; isotropic; associated with pyrargyrite; positive reactions with $HgCl_2$, KOH, $FeCl_3$ and HNO_3, negative to HCl; occured in such small quantities that a microchemical test was not done but etch tests seem to indicate canfieldite.

(c) Paragenesis - There appears to be three periods of deposition and possibly four.

1. Arsenopyrite and pyrite. These minerals are replaced by gangue, galena, sphalerite, pyrargyrite, and chalcopyrite.

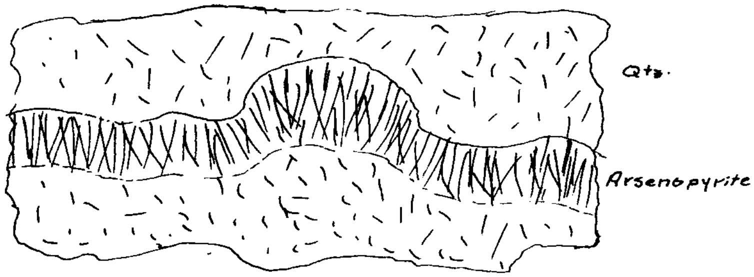
2. Quartz gangue. This is replaced by galena.

3. The galena, sphalerite, pyrargyrite and chalcopyrite appear to be contemporaneous. In some areas the pyrargyrite appears to lie along the cleavage of the galena but in most areas it has a random scattering. The canfieldite always occurs with the pyrargyrite and the gold occurs in the

galena. The chalcopyrite occurs as exsolution blebs in the sphalerite and tends to occur along two planes which make 60° with each other. Figures at the end of the report show some of the mutual relationships of the minerals.

(iii) Arsenic Group

(a) Macroscopic Examination - The arsenopyrite occurs in small curving stringers in an acicular form. These small stringers are about .25" wide. Some specimens show a great deal of pyrite along with galena, sphalerite and chalcopyrite. A typical specimen is shown below.



(b) Microscopic Examination -

Arsenopyrite, pyrite, chalcopyrite, sphalerite and galena were determined by microscopic and microchemical methods. In one small area gold was found in very minor amounts. More should have been found since the samples assay 2 oz. of gold per ton.

(c) Paragenesis - There appears to be three periods of deposition;

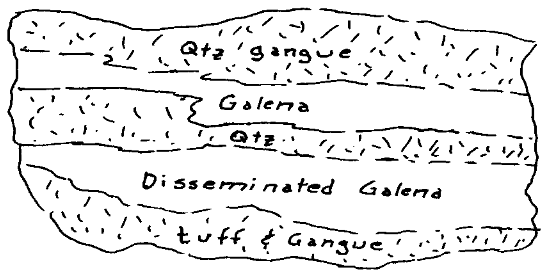
1. Arsenopyrite and pyrite. The arsenopyrite seems to be replaced by sphalerite, galena and gangue and seems to be contemporaneous with the pyrite.

2. Quartz gangue. This appears to be replaced by sphalerite and galena.

3. Galena, sphalerite,and chalcopyrite seem to be contemporaneous since all the contacts seem to be smooth and do not seem to indicate replacement. The figures at the end of the report represent the mutual relationships.

(iv) Silver Belle

(a) Macroscopic Examination - On one specimen silvery grey needles, soft and shewing striations were seen which were later shown to meneghinite. The remaining minerals showed a banding which could be shown by the diagram below.



(b) Microscopic Examination

Galena - As determined before.

Sphalerite - " " "

Chalcopyrite- " " "

Tetrahedrite - Light grey color; soft; isotropic; etch reactions and microchemical tests showed it to be tetrahedrite.

Bournonite - Slightly darker grey than galena; soft; anisotropic with colors of grey,-green, blue, and brown; in places showed twinning; negative to all tests except aquia regia and was shown to be bournonite by X-ray.

Meneghinite - Color was light grey; soft; anisotropic with colors of grey, brown and blue;etch tests were negative except maybe HCl and positive for HNO_3 which was slow in starting but then advanced as a wave; occured as slender prisms.

(c) Paragenesis - There appears to be one and possibly two periods of mineralization;

1. Quartz gangue.

2. Galena, sphalérite, chalcopyrite, tetrahedrite, bournonite, and meneghinite(?). The relationship betwwqn the first five minerals was seen but ths meneghinite occured in a different section so that a definite relationship was not obtained. By examining the oompositions of the minerals we get a fairly good idea as to how they should occur.

galena	- PbS
meneghinite	- $4PbS.Sb_2S_3$
bournonite	- $Cu_2S.2PbS.Sb_2S_3$
tetrahedrite	- $3Cu_2S.Sb_2S_3$

When galena and tetrahedrite come into contaet with one another, bournonite could be formed where the concentration of copper was greatest and meneghinite could be formed where the concentration of lead was the greatest. Therefore under very ideal conditions the relationship between these minerals should be as follows; The bournonite should be in contact with the tetrahedrite which was the caae and the moneghinite in contact with the bournonite and the bournonite in contact with the galena which was again the case. Probably if enough time was available an area could be found where this ideal setup would occur.

General Remarks

1. Considering the four properties on Chikamin Mt., there appears to be at least three periods of deposition and maybe four.

a. arsenopyrite and pyrite

b. quartz gangue

c. sphalerite, chalcopyrite, galena, tetrahedrite, pyrargyrite, bournonite, meneghinite

d. pyrargyrite (?)

The four periods would be present if the pyrargyrite is considered to be later than the galena. In some areas the pyrargyrite definitely followed the cleavage of the galena but in others it had a random scattering. We also see that the high temperature minerals such as arsenopyrite are formed first and the final mineral is pyrargyrite which is a relatively low temperature mineral.

2. The presence of pyrite, arsenopyrite, chalcopyrite, galena, tetrahedrite and gold along with quartz gangue, in veins which have regular walls and a regular strike and dip seems to indicate a mesothermal deposit according to Lindgren's classification of mineral deposits. The temperature of formation is 175°-$300^{\circ}C$..

3. Since mesothermal deposits in other parts of the world usually have great vertical extent with no abrupt change in mineralogy, this deposit would probably fill the same conditions. Therefore as far as continuity is concerned, this deposit is alright in that respect.

4. The average widths of the mineralized veins is about 2',

but in many places it is much narrower than that. This width is a definite hindrance as far as base metals are concerned. Thus in order to warrant exploitation, the precious metal content must be the controlling factor.

5. Since precious metals are the controlling factors, the most favorable claims of the four discussed would be the Arsenic Group and the Upper Nickel. The Arsenic Group shows good values in gold and so should be investigated further. Likewise the Upper Nickel should be investigated for its silver content.

6. If favorable grades of the precious metals are at some time shown to be favorable, there are a large number of factors which must also be considered. These include water supply which is not good in this area; electricity which is also lacking; transportation which would be very costly because of the distance to the nea rest railroad; and there is also the problem of mill and campsite and the adverse weather conditions. Therefore, in order to overcome all these difficulties, the grade of ore must be fairly high which at the present time do not seem to be present.

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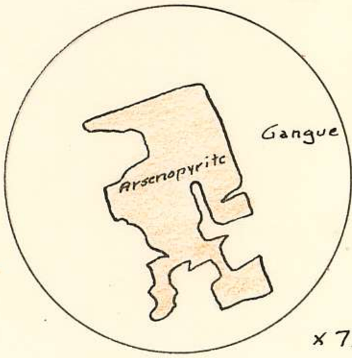
Diagrams Showing the Mutual Relationship of the Minerals



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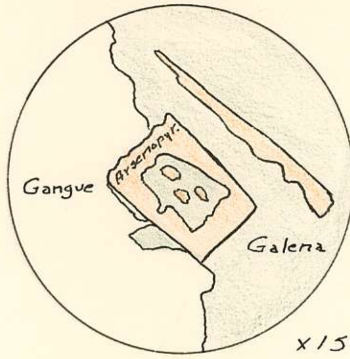

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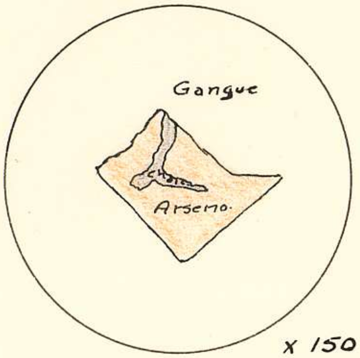

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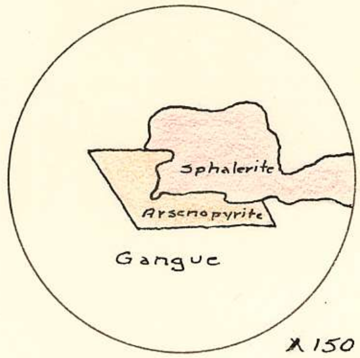

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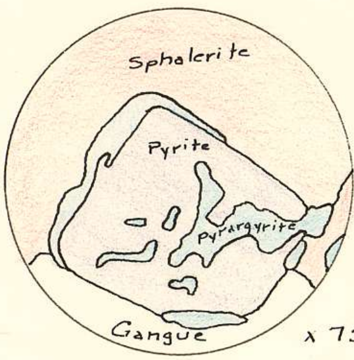

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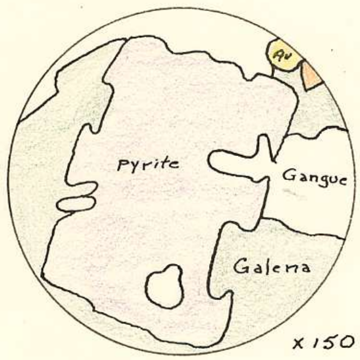

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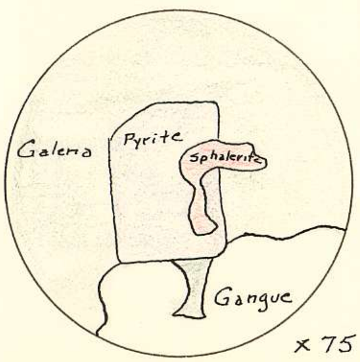

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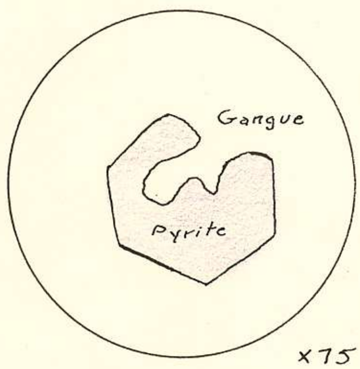

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Chikamin Mt. Deposits L.D.Fenske

List of Sections

Arsenic Group:

1. arsenopyrite, galena, chalcopyrite, sphalerite.
2. arsenopyrite, galena, sphalerite.
3. galena, pyrite, arsenopyrite, chalcopyrite, sphalerite.
4. arsenopyrite, galena, sphalerite.
5. arsenopyrite, pyrite, chalcopyrite, galena, sphalerite.

Upper Nickel:

6. galena, pyrargyrite, sphalerite, arsenopyrite, pyrite, gold, chalcopyrite, canfieldite (?).
7. sphalerite, chalcopyrite, arsenopyrite, galena.
8. pyrite, galena, sphalerite, chalcopyrite, arsenopyrite.
9. chalcopyrite, galena, pyrite, arsenopyrite, pyrargyrite, sphalerite.

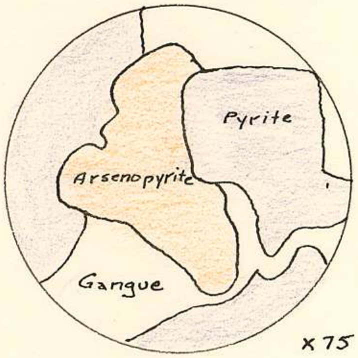
Ruby Group:

10. arsenopyrite.
11. pyrite, galena, sphalerite.
12. arsenopyrite, pyrite.
13. pyrite, galena, chalcopyrite, sphalerite, arsenopyrite.

Silver Belle:

14. galena, tetrahedrite, bournonite, chalcopyrite , sphalerite.
15. galena, sphalerite.
16. " "
17. " "

Diagrams Showing the Mutual Relationship of the Minerals



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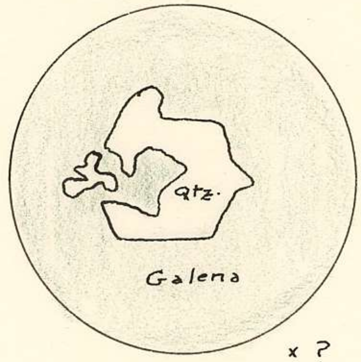

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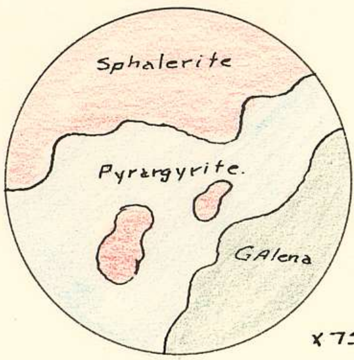

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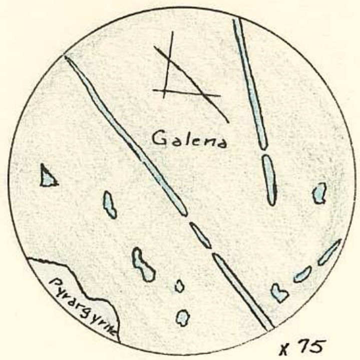

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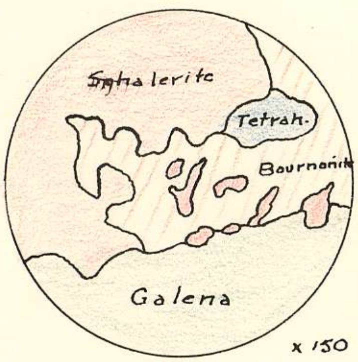

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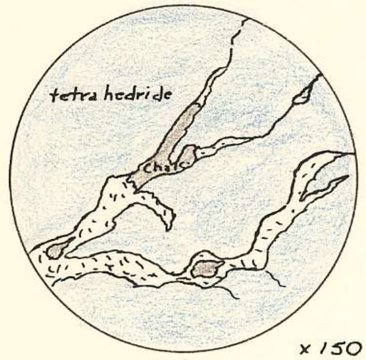

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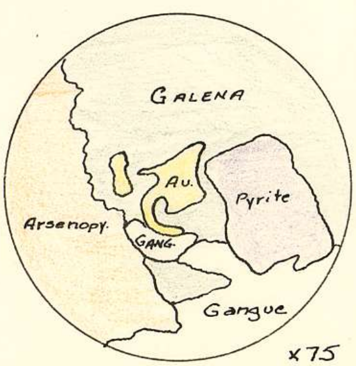

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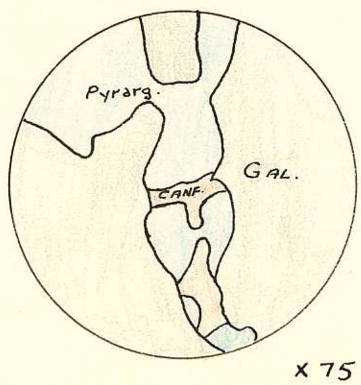

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