

MEETING OF MARCH 1st, 1886.

---

NOTES ON SOME BOULDER COUNTY VEINS.

BY P. H. VAN DIEST.

One of the objects of this paper is, while describing some of the most important veins of Boulder County, to indicate a direction in which the members of our Society, particularly those who are engaged in the examination or operation of mines, may be instrumental in advancing our knowledge of ore-deposition and occurrence. Short papers, giving the facts observed in certain localities or even in a single mine, while not attempting an explanation of these facts, may, in the hands of our member Emmons for instance, become of the greatest importance in generalizations and in theoretical deductions which may account for observed peculiarities or phenomena wherein our deposits differ from those of other mining regions. They may also be of value in testing existing hypotheses on ore-deposits. With this object in view I volunteer a few observations made during a short visit to the telluride districts of Boulder County.

So far as I am aware no publications calling attention to the telluride veins of this region have appeared since the short notes of Marvine and Silliman in 1874. At that time the Red Cloud mine had only been explored to a depth of 70 feet and the existence of telluride ores in other parts of Boulder County was unknown. It is true that telluride minerals themselves have received attention from Genth and others, but their mode of occurrence, except in a few remarks by J. Alden Smith in his Biennial Report of 1880, has passed unnoticed. It may thus be *apropos* and interesting to attempt an account of observations made in recent years in other districts of the telluride region.

Leaving the red beds of the Trias (?) at the base of the mountains near Boulder City and following up the Boulder Cañon in a westerly direction we come at once into the Archæan exposures of the Front Range. At first the rocks present a distinctly schistose or gneissic structure, in some parts evenly banded, in others more or less contorted, with a general dip to the northward. The color is generally gray but in some places the rock is very dark through abundance of hornblende and occasionally small bands of pure hornblende rocks are observed. Here and there thin veins of dull quartz run irregularly through the mass but mineral-bearing veins are not observed excepting perhaps some narrow seams, carrying a little blende and galena, lying beside the dark hornblendic bands. Where this gneiss occurs the cañon is narrow and the bounding ridges show rough and ragged outlines. After passing the confluence of the Middle Boulder and Four Mile Creeks the gneissic rocks merge into massive granites, in some places compact and of a grayish color with many small scales of tombac-brown mica, and in others coarse-grained, with flesh-colored feldspar and but little, light-colored mica. As we advance the cañon widens, has walls less steep and the hill-tops show rounded or dome-like forms. Here and there patches of enclosed schistose rocks occur, but they become rarer and are missed entirely when we reach the heart of the Gold Hill Mining District. This district embraces Sunshine and Gold Hill proper. The Gold Hill granite, like that of Magnolia, Jim Creek, Ward and Sugar Loaf districts, has undergone extreme metamorphism and all traces of definite structure have disappeared. In several places dykes of felsite-porphyry are observed, some of them being indicated on the accompanying map.\*

The felsite dykes in the vicinity of Gold Hill have a N.E. and S.W. course, while those near Sunshine run due north and south. The broad quartz segregations of the

\* This map was originally prepared to illustrate an article on the resources of Boulder County which appeared in the biennial report of the Colorado State School of Mines. This explains why the map takes in a larger part of Boulder County than is embraced in this article.

former locality run N.W. and S.E. while in the latter the direction is N.E. and S.W. Valuable telluride ores are found along the walls of the felsite dykes and also along the sharp demarkation lines of the granitic layers.

It may be observed that there are three distinct regions where the telluride veins occur in groups, viz: Sunshine, Gold Hill proper and Magnolia. The veins in these districts show a general N.N.E. strike. As a rule the extent is not very great, for, while the mine-locations are limited to 1,500 feet and usually lie in a straight course, the vein cannot be traced on the surface a greater distance than 200 feet from the discovery shaft, nor as well as it can be underground. On the surface, before the distance named is reached, the vein usually unites with another vein which likewise appears for a short distance and then loses itself through other combinations. Sometimes a vein sends off shoots or spurs to either side which with a bend return again, or the first followed vein may pinch out entirely. Often small veins run parallel with each other for some distance, the intervening space being filled with granite generally free from mica but frequently containing pyrites. A short description of one of the most typical veins of Sunshine may illustrate the foregoing.

In the road near the junction of Silver Gulch with Gold Run we observe a brown-stained streak in the granite; this is the outcrop of the Ingram Lode. In the blacksmith-shop, between the road and the northeast hill-slope, it can be seen on the surface that the vein divides into two spurs and behind the shop each spur is followed by an adit. The first or westerly streak has been followed about 40 feet and the ore shows flakes or plates of sylvanite. At a distance of 15 feet is the second adit following the other spur which proved at first to be more prominent but at 80 feet from the entrance this streak pinched out. From this point the first mentioned spur was reached by a cross-cut and proved to be rich in ore for about 40 feet when it also became divided into two spurs.

Both these spurs were followed, one for about 50 feet, the other for about 100 feet, at which point it forks again, one spur soon pinching out. The mass between the two streaks, from 10 feet to 15 feet thick, is to some extent mineralized, principally with small crystals of auriferous pyrites and minute particles of telluride ore. The streaks followed on each side of this mass are from 6 inches to 20 inches thick. In these streaks, containing more quartz than country rock, we observe numerous interlacing threads and bands which enclose the rich telluride ores, either petzite or sylvanite, principally the latter in the form of graphic tellurium. In the upper adit, which is 80 feet above the main adit and follows the principal streak, this interlacing characteristic is more easily observed as the threads are red-stained by surface decomposition or oxidation of the minute crystals of pyrites mixed with the tellurides. The same features characterize the Grand View, American, Monongahela, and in fact all the Sunshine veins. The quartz in these veins, principally in those near Sunshine, contains many small geodes the interiors of which are filled partly with crystalline quartz and partly with a coating of chalcedony. Minute particles of rhombic pyrites, probably marcasite, are so finely divided in the quartz that they produce the effect of a dark stain. This form of quartz is characteristic of the veins of the Sunshine district. The occurrence of marcasite, which accumulates often to large sized combs, is also peculiar to this district, in fact it is met with in all the veins having a northerly and southerly trend, lying between the American and Logan mines. The Gold Hill veins also contain pyrites but in a less finely-divided condition, and in the Horsefall, Slide, Prussian and other veins the cubic crystals are of the size of peas or larger. The Gold Hill ores are practically free from zinc while the Sunshine ores often show small particles of resin-blende. In the Sunshine district the few veins that have a northwesterly course, for instance the John A. Dix and the Little Miami, show, besides some

telluride (probably hessite), silver ores, principally stephanite, pyrrargyrite and proustite. The Goldsmith Maid and Yellow Pine are principally silver veins.

The Hoosier, near the Goldsmith Maid, is a wide quartz vein outcropping at least 12 feet above the surface of the country rock. The quartz is opaque-white, in places friable and contains fine particles of ruby-silver widely dispersed. Near by, on the hill directly north of Four Mile Creek, several quartz-veins outcrop boldly. These veins are stained green by fine particles of partly oxidized copper pyrites.

The veins of Magnolia district differ from other Boulder County veins in containing less quartz and pyrites, and it is rarely that quartz streaks occur in connection with the ores, while the latter are more generally disseminated through the granitic gangue. This district has furnished the greatest number of telluride minerals; among them *native-tellurium* : *melonite* : *coloradoite* : *altaite* : *calaverite* and *lionite*, which minerals are much scarcer or absent entirely in Sunshine and Gold Hill. The Grand View and Phil. Sheridan mines of Sunshine contain a silver-white mineral, which, according to an analysis by Prof. Edmond Fuchs of Paris, to whom the writer sent several samples in 1875, has the following composition :

Au	Ag	Te	Fe	S
5.228	4.198	19.650	70.624	trace

indicating that it is largely a telluride of iron.

West of the American mine several prospect holes show ore containing, besides *nagyagite* and *altaite*, disseminated particles of galena. Still further to the westward we observe patches of jointed granite which form to some extent the line of separation between the Sunshine telluride-vein group and that of Gold Hill. Following the regular road from Sunshine to Gold Hill it is noticeable that the granite occasionally becomes schistose in character, and when it loses this character spots of graphic granite are observed. Beyond the Horsefall, at the

summit of Gold Hill, the granite shows large crystals of magnetite; and going from Sunshine along the trail towards Left Hand Creek, west of the Tillie Butsel, it contains here and there veins and patches of schistose rock and frequently quite large sheets of mica. A little beyond and further westward is the Belle of Memphis, a very flat vein and the only one of the kind in the neighborhood.

The Sunshine veins and also those of Gold Hill are as a rule nearly vertical. Several of the veins in Magnolia district lie comparatively flat or have a dip of about 30°. Such veins have generally a northwesterly course like the Belle of Memphis.

The rock of the Sunshine dykes is coarsely-crystalline in character and free from quartz, while that of the Gold Hill dykes shows distinct crystals of feldspar with a few specks of quartz in a felsitic ground-mass; its appearance suggesting the elvan dykes of Cornwall. Near Left Hand Creek west of the Corning Tunnel there are two similar dykes of a few feet in thickness, running nearly parallel, and on the opposite hill near the Gray Eagle mine a continuation of these dykes was noticed, but with a greater distance separating them. The dyke between the Red Cloud and Cold Spring is probably the largest, being from 35 feet to 45 feet thick, while the dyke near the No Cash is only 10 feet thick on the surface. The thickness of the former diminishes rapidly with depth and finally it disappears entirely. When the Cold Spring shaft was sunk to a depth of about 400 feet a blast in the foot-wall of the vein broke through the dyke into the old workings of the Red Cloud mine. These facts go to show that the dykes have but a limited downward extent and lend support to the opinion expressed by A. R. Marvine who says, "I doubt if any of the large granite masses of the mountains are of true intrusive character, and even if those smaller ones which are clearly intrusive are other than of the same series of rocks melted by the heat accompanying the metamorphism of the mass."