Quartz Mining in the Vicinity of Auburn.

During the year 1881 the quartz mining interest around Auburn and Ophir in Placer county has been about stationary. Some mines which, during the preceding year, produced considerable gold, -were not worked, and in several others but little milling rock was taken out. In place of these a number of old and abandoned mines were prospected and reopened. The bullion yield from the best sources of information was about $75,000, rather less than the yield of 1880.

The causes of the stationary condition referred to are two-fold; First, lack of outside assistance in the shape of capital. Second, lack of enterprise, capital or knowledge of the best means of development on the part of the present owners. Capital for several years past has been shy of investing in the Auburn quartz ledges. It is quite generally asserted and believed among mining men and investors that these ledges are very pockety in the distribution of the metal they carry, and lack permanence with depth. Of many of the mines the first statement is undoubtedly true, but the second yet remains to be proven with regard to many of them.

The quartz veins of this district differ materially among themselves, within certain class limits, in nearly all important characteristics. Their general course is approximately east and west, the greater number trending north of, rather than south of east. Cross veins occur at all angles and are not uncommon in certain parts of the district. The general dip is to the south and southeast. In thickness they vary between extremes of 8 and 10 ft. on one side down to one and two inches on the other, the average being about 2 ½ ft. Two country rocks occur, metamorphic slate in the northern half of the district, and granite in the southern, the line of junction of the two formations running nearly east and west.

Three general classes may be made of the quartz veins, two of which are found in the slate formations and the other in the granite. Of the two classes in walls of slate, the lesser in importance, but the most peculiar in characteristics, are what are known among miners as reef-iron ledges. They have no general direction or course, but run irregularly, crossing each other at all angles. As a rule, they are quite narrow, ranging from a few inches to two ft. Running at right angles to the strike of the country rock (slate), are belts or bands of slate highly impregnated with iron pyrites, which, wherever reached by the atmospheric water, is oxidized, and presents all the appearance of an iron ore. From these iron deposits the quartz ledges which are crossed by them are known as reef-iron ledges. The pay chimneys or chutes of ore, though perhaps better termed a series of pockets, are found in the ledge pitching to the west, either adjacent to or in that part where intersected by the iron reef, the rest of the ledge being worthless. Those ledges which have paid the best are found to have very irregular walls, the vein pinching and splitting into stringers wherever the iron is encountered. The yield of gold from some of these pockets is very large—they run in value from a few hundred to several thousand dollars. The valuable rock is hand sorted, the richest crushed in mortars, and the rest worked in some custom mill. This kind of quartz mining is of necessity very uncertain in its returns, and as the amount of pay ore is comparatively small, and the ledges liable to pinch out and disappear as depth is attained, but little fixed capital is employed. It is, however, followed by small companies of working miners, to whom it recommends itself by possibilities of large returns on a comparatively small outlay with a fair measure of success. In the aggregate a large amount of this kind of mining has been done, and has yielded a large amount of gold. The Friday, Eckley, Almatah and Iron Point are at present the most important of the mines. Very little work has been done on any of them during the past year.

The other and more important quartz ledges found in the slate have been mined much more systematically, and in some instances have proven very rich. The greater number are at the eastern end of the district, the distinctively reef iron ledges being west of and between them and the granite formation.

These ledges all have about the same general direction—a little north of east. On Duncan hill and in its vicinity, they are best developed, seven distinct parallel ledges averaging 30 inches in thickness being traced by croppings from 500 or 600 to several thousand ft. The presence of iron pyrite or iron oxide in the ledge walls seems to have much the same effect as in the reef-iron ledges, as regards the position of the ore chimneys, the difference moat marked being that those ore chutes pitch to the east instead of the west. Also, instead of the quartz being barren and worthless, with the exception of a few extremely rich specimen pockets, comparatively large chutes of milling rock occur, and in these chutes, occasional rich pockets yielding from a few hundred to several thousand dollars. The ore is free milling and the gold usually quite coarse, many of the pockets being quartz rich enough for jewelers' use. Among the most important of the mines located on these ledges are the Shurtlefff, Conrad, Thorp, Hunter, Booth, Crandall and Mina Rika. Of these, the Booth and Crandall had only a have had tunnels run to reach greater depths, and other improvements made; but little ore being taken out and milled during the year. The Hunter and Thorp mines have yielded some ore, but the main producing mine has been the Mina Rika. This latter, when the others during 1880 were yielding large amounts of ore milling from $30 to $200 per ton, was an abandoned mine. Relocated and prospected anew, a considerable body of high-grade ore was discovered. The mine, then sold to an Eastern company, has been yielding excellently for several months past, having, it is claimed, nearly paid for itself in that time.

Bellevue mine, on the west end of the mines in the slate belt, and about one-half mile north of Crater hill, is close on the line of junction between the two country rock formations. Several years since, it ranked as one of the best mines in the district. The vein was not very wide, but the ore was of high grade, free-milling $50 and upward per ton. Considerable of this rock was taken out and milled, but at a depth of about 200 ft. the ledge was lost. The mine was finally sold under execution, and after lying idle for some years, a portion was purchased by a couple of Cornish miners who had worked in the mine. They recovered the ledge at a depth of 8O or 90 ft., where it had worked off into the wall as a small stringer and have since been taking out from a ledge 4 to 10 inches wide, rock milling $90 and $100 per ton. The sulphurets of which the rock contains a large percentage, are also extremely rich.

The quartz ledges that are found in the granite formation, are more numerous, larger, richer, more permanent and have been worked more extensively than the ledges just described. Though some of the quartz deposits occurring in the slate are undoubtedly true fissure veins, the evidences that they are such are not near as conclusive as in the case of many of the ledges in the granite. The walls of many of the latter are smooth and striated; a gouge is usually present, and the ledges much stronger and better developed at the greater depths to which exploration has been carried. Their general course is east and west, or northeast and southwest. The greater number are concentrated around and on what is known as Crater hill. The entire surface ground in this vicinity has been washed and rewashed, yielding large amounts of placer gold, all of which, beyond doubt, came from these ledges.

(To be Continued.)

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The most important of the mines is the St. Patrick or Crater Hill. From this mine, or rather from its San Francisco management by stock sharps, the district owes what is known among the mining fraternity as its "black eye." Under the aforesaid management, as soon as the manipulators had unloaded the stock at a high, figure under the influence of large mill returns, the ledge was lost (?) and assessments levled till the stock was again secured at a low figure. The ledge would then be found, dividends resumed,

and the stock raised high enough to make a repetition of the operation profitable. This method of mining several times repeated became monotonous to investors, and the mine running behind under poor local superintendence, was attached and sold under execution. Since the sale, the mine has only been worked occasionally, but has nevertheless paid its purchase price, about $17,000, and some additional amount in dividends. The mine is worked through an incline shaft to a depth of 700 ft. , this being the only ah aft in the district over 200 ft. deep. Steam hoisting works take the ore out of the mine. The amount of water in the mine is comparatively insignificant, barely enough being obtained in summer time to supply the boilers. The ledge near the surface was at times quite narrow, particularly in passing through a belt of extremely hard rock from 100 to 150 ft. in depth. Below that it widened to from 2\ to 3 ft., and even more, occasionally, A pay-chute about 400 ft. long was found pitching to the east. It has been followed and worked to the east line of the mine down to the 700 level, where it passes out of the mine into the east extension owned by other parties. In the bottom of the shaft, another chute is coming in from the west, and at the present time, the shaft is being retinibered, with a view to sinking deeper and opening up this body of ore. The total yield of the mine has been in excess of $600,000.

Other important mines in the granite formation are the St. Patrick Consolidated, the Gold Blossom and its several extensions, the Mammoth and the Bowlder. All of these have been worked to some extent but to no great depth. The St. Patrick Consolidated being the east extension of the Crater Hill, is undoubtedly a valuable property, receiving from the 300 to the 700-ft. levels the great pay-chimney of that mine.

The principal differences that exist in the quartz veins that have been described, are most prominent in the mineralogical composition of the ores. Pyrite is found in greater or less quantity in all the quartz veins; in the slate formations it occurs principally in the common cubical crystallization; in the Bellevue and Crater Hill and other mines, in the granite, it often occurs in brilliant, highly-modified crystals. It is almost invariably accompanied with gold, particularly in veins in the granite. Chalcopyrite is also common but is most often found in ledges in the granite. Galena is even more common than chalcopyrite, and is found accompanying the other two. In the Conrad mine crystals of galena are found containing flakes and wires of bright gold. In nearly all mines in the granite the galena carries considerable gold, probably more gold than silver. This fact renders the treatment of these ores quite difficult. Heavy sulphureted ores assaying high figures fail to yield by the ordinary mill process one-tenth of their assay value, the bulk of the gold being run off' into the tailings. There is no good reason why this should be the case. With battery amalgamation (not practiced at present) and proper sulphuret concentrators, these ores should be made to pay extremely well. Ores from the granite formation, in addition to the preceding, contain tellurium and selenium compounds; in the slate aluminum compounds and calcite, all in small quantities. Zincblende is of common occurrence, but antimony and arsenic are not found. In the quartz deposits in the granite free coarse gold is seldom to be seen in the rock; the reverse is the case with the ledges in the slate. The sulphuret concentrations which are principally iron pyrite vary from $75 to $500 per ton. The great bulk assay $150 per ton and upward.

During the year a sulphuret reduction works known as the Auburn Chlorine Works, has been built and commenced work under the superintendence of Mr. A. Maltman. The roasting furnace used is a two-hearth reverbatory step furnace, having a working capacity of about 4, 000 lbs. in 24 hours. The chlorine process is used for extracting the gold, and the residues are then treated by the hyposulphite of soda process for the silver. In the aggregate about 150 tons of sulpburets were treated, yielding in round numbers about $7,000 in gold and $1,500 in silver. The efficiency of treatment is claimed to be about 87% of assay value.

In milling facilities the district is quite deficient; there are two small five-stamp custom mills, which do fair work with rock containing coarse free gold, but which are utterly unable to work sulphureted area, having only the most primitive apparatus for concentrating tailings. The St. Patrick or Crater Hill mill contains 15 stamps and six old style Hendy pans for concentration. It is much superior to the others noted but is still far behind the requirements of the district. What is needed is a well constructed mill, containing very complete ore dressing or concentration plant. Before the tailings' from the battery can be properly concentrated a preliminary sizing of the particles is needed, which can be secured by jiggers or similar apparatus,

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