

I might talk for a little while on prospecting, though to some of you this will be superfluous, yet we may in concluding touch on some points of interest. I have been out many a time and have had many a weary walk prospecting, sometimes in company with old timers of many year's experience, whose ideas of geology sometimes might be said to be fearfully and wonderfully made, yet who seemed to have that great intuitiveness in the finding of mineral, for when they quickly spy out traces of ore they have that eagle eye to follow it up. On almost any spring morning, if you would happen along some of the roads leading out of almost any of the mining centres of Colorado, you would see a solitary prospector, or perhaps two in company, driving or punching a "burro," or donkey laden with supplies for the summer; pick, shovel, steel, powder, and a stock of what the miners call "sow-belly," flour, and a small camping outfit, thus he will start out on his lonely, often perilous trip, seeing no other man perhaps till the snow falls and he returns back for the winter to camp. I have gone out repeatedly with prospectors who have located claims to see what they had, and on such trips I became quite proficient in the peculiar vernacular commonly used in talking to the burros while 'punching' them over the trail, and the burros in time came to understand me quite as well. These burros are spoken of in Colorado as the "Salvation Army of the Rocky Mountains," and the title is not illy applied. A great many mines there have been developed by the aid of these burros, as 8 or 10 of them will pack out a ton of ore, and they will go anywhere a man can, except up a tree. When Leadville was discovered and the blue limestone was found to carry ore, hundreds of prospectors started out along the range looking for the blue limestone. Some crossed over to the Pacific slope, met with the hostile Indians and were massacred. But the ore was found on the Pacific slope. The prospector keeps his weather eye open, he looks along the beds of rivers and streams, watching for quartz and for crystalline limestone, or calcite, and also for that which resembles calcite, namely 'heavy spar.' He will watch for traces of iron and copper pyrites, as he knows these may indicate 'mineral' and when he finds 'float' that gives good indications he will notice if it is a fragment that is rounded, showing whether it has travelled some distance, he will follow up the stream, and if he finds the pieces of mineral increasing in number and having a more angular appearance he will become more hopeful and watchful. Prospectors have spent months and even years trying to find out where their mineral came from and I have seen districts where you could pick up pieces of pure argentite or silver ore, and though thousands of dollars have been spent there, the deposit has never yet been found. On one of our mountains there can be found the richest kind of float, and much of it, yet they cannot find its source. In finding ore in what appears to be 'rock in place,' the prospector must be sure that it is not a 'slide,' or his location may be practically worthless. When the ore deposit is located, you will find the miner of long experience expending all his labor and energy on that spot, unless it is practically inaccessible, tunneling or sinking a shaft or incline where he has actually found ore, and he finds out the direction of the lead if possible, though this is sometimes hard to trace.

The prospector must become familiar with the changes due to the decomposition of sulphides, of iron and copper pyrites, as the upper part of many ore bodies are much altered and disguised.

After finding the ore and sinking on it you are then in a position to ascertain something of its size and value should you wish to place it on the market, and in ninety-

nine cases out of a hundred it will present a more favorable aspect to the expert who may be sent to examine and report on it if you have done work that shows up the deposit itself. Other work is of no value or service to him, and any report otherwise would not be to the advantage of the prospect and capitalists would refuse to have anything to do with it. I have seen three men with only a grub-stake, a few tools, and some powder sink a shaft 200 feet deep, using a hand windlass, and finally on getting out considerable ore and packing it to the sampling works on the backs of burros they were able to make a little money to work on a larger scale, and many good mines have been developed in this way. The American plan of developing mining properties is to be recommended, in that they spend as little as possible on the surface. If the miner needs machinery he starts with a windlass for the first 100 feet; after that he buys, or rents even, some cheap hoist of 20 or 30 horsepower which will do for the next few hundred feet. It is not absolutely necessary that houses or cabins be put up early, mining men being content to live in tents while the mine is being proved up, and miners are usually able and willing to put up for themselves small cabins.

We have often seen fancy machinery, and unnecessary machinery, placed upon the property when every dollar so spent was required instead in opening up the property underground. If you wish to solicit capital from the East or elsewhere even though you show them big assays they will be suspicious. They have learned a thing or two, and if you have property you think is good try and get work done underground on it, if you do not know how to mine get someone with you who does and let him help you out, develop it and put it in such shape that a would-be buyer can form some idea of its worth.

I have exceeded the time I should have talked this evening. I think, however, this is one of the most vital points in opening a mine; *i. e.*, to spend your money *underground*.

If in these talks, with but a scant and hurried preparation, on mines, mining, and ore deposits I have interested you at all, or have brought before you anything that may prove of some little value and assistance I shall be very pleased.

Lectures on Chemistry.

BY HERBERT CARMICHAEL, PUBLIC ANALYST AND ASSAYER.

HISTORY.

In these lectures I do not profess to bring before you anything original, but to explain to you, as simply as I can in the four lectures at my disposal, the general principles of the science of chemistry.

We must look through a long vista of ages if we would discover, buried in the obscurity of earliest history, the origin of what is rightly called the Science of Chemistry.

We know little about the period when the few facts, which formed its beginning, were gathered together, but it appears probable that Egypt was the country where this took place.

In the works of the Byzantine writers of the fourth century the word "chemia" first occurs as the name of the art which treats of the production of gold and silver, and as all these authors were closely connected with the celebrated school of Alexandria, the last resting place of the proscribed secrets of the Egyptian priests, it appears probable that our science was first practiced in Egypt. Indeed Plutarch states that the old name