

MEETING OF JANUARY 7, 1885.

ADDRESS OF THE RETIRING PRESIDENT,

RICHARD PEARCE.

Gentlemen :

The Colorado Scientific Society may well congratulate itself on the excellent results of its labors during the two years of its existence. The proceedings of the Society, which are now being printed and will soon be in the hands of the members, show that a great deal of valuable matter has been brought before the members of the Society, from time to time, in the forms of papers, notes, and discussions, having a special reference to the mineralogy and geology of this western country. I think we may reasonably predict from the present healthy condition of the Society that it will continue to grow, and become an important element in the scientific development of Colorado and its adjoining States and Territories.

The science of mineralogy has been especially benefitted by the labors of the Society, a great many additions having been made to the list of strictly Western minerals; but by far the most important of the Society's achievements is the discovery of three distinct new minerals, the result of some extremely delicate analytical work by our new President-elect, Mr. Hillebrand, assisted by Mr. Cross.

One of the main objects of the Society from its start has been to get together a collection of typical Western minerals, and I think we may say that we have been fairly successful in this direction. Owing to the lack of funds, we have been limited to presents of minerals from our members. The time has come, however, when it becomes necessary to get a special fund for the purpose of securing rare minerals, which can only be had by purchase, and I think we may reasonably hope for aid from the State, as well as from some of our friends who are not mem-

bers of the society, for such a laudable purpose. I would suggest to those of our members who have opportunity of collecting specimens of minerals for the Society, the desirability of obtaining accurate data as to the exact conditions under which any particular mineral may be found. The character of the deposit, the matrix, the associated minerals, the country rock, all these are points of interest to the scientific mineralogist, and are often of great value from a commercial point of view.

The study of rocks, particularly of porphyries, diorite, etc., and the relation they bear to the valuable metals which often occur associated with them, is a subject well worth the attention of the members of this Society, and I know of no other country which offers such excellent opportunities for the study as the mineral-bearing belt of the Rocky Mountains.

I may, perhaps, be permitted to draw attention to the occurrence of gold and silver in combination with tellurium, in connection with porphyry and other intrusive rock, in Boulder County, San Juan, the Bassick mine, and in Montana. These localities have from time to time been referred to in connection with various interesting combinations of tellurium with gold, silver and other metals; but with the exception of the remarkable deposit of the Bassick mine, no particular attention has been given, so far as I know, to an exact account of the conditions under which these rare minerals are found.

I have observed evidences of the existence of tellurim in a large deposit of auriferous pyrites occurring at Bannack, Montana Territory, and have actually found the mineral nagyagite in a mass of diorite which formed one of the walls of this deposit, the other wall being limestone. The ore from this mine, although tolerably rich in gold, could not be worked successfully by the ordinary amalgamation process, and this, I believe, was mainly due to the fact that the gold was largely in combination with tellurium. I am under the impression that a careful examination of auriferous pyrites, from different localities, which would be classed generally under the head of refractory ores, will demonstrate the presence, perhaps in minute quantities only, of tellurium, and will prove that this metal is more frequently associated with gold than is generally supposed.

The occurrence of native gold in distinct pseudomorphs after sylvanite, in Boulder county, would indicate that native gold may in some cases have been derived from the alteration of auriferous tellurides, and I have reason to believe that some of the beautiful specimens of native gold which I have seen from the Cable mine, Montana, are the result of the alteration of nagyagite, for we find this mineral associated with the gold, and in many instances showing strong evidence of decomposition.

Mr. R. C. Hills has drawn the attention of the Society (in a paper of his on the ore deposits of Summit District*) to some interesting chemical points, showing that there is a strong probability that native gold has been by some means removed by solutions from the upper oxidized portions of the deposit and again precipitated at a greater depth. In the discussion which followed the reading of the paper I ventured to suggest a possible explanation of the cause which produced such a change, and I have recently made a simple experiment which demonstrates the possibility of such a change as I have referred to, happening in nature.

In a small flask were placed some crystals and wires of native gold from the Ontario mine, some finely divided hydrate of binoxide of manganese was added and the flask filled with water containing about forty grains of salt per gallon, and some few (five or six) drops of sulphuric acid. The whole was kept quite hot for twelve hours and at the end of that time the solution showed a strong reaction for gold.

It is quite within the bounds of possibility to suppose that some such change occurs in veins containing gold. The circulation of water containing soluble chlorides through masses of manganiferous gossans, in presence of free sulphuric acid derived from the oxidation of pyrites, would, with perhaps the aid of heat and pressure, have the effect of dissolving any free gold present in the gossan, to be reprecipitated at some point of greater depth in the vein, where the reducing action of metallic sulphides, and, perhaps, ferrous sulphate would come into play.

To those of our members who are directly engaged in mining, and who have opportunity from day to day to study the

*These Proceedings, vol. 1, p. 20.

varied conditions of metalliferous deposits, I would suggest the importance of directing attention to the jointed structure of rocks, and the relations these joints bear to mineral deposits. In Cornwall it has been pointed out that there is an intimate relation between the direction of the lodes and that of the principal joints of the rock in which the veins occur, and I have seen examples of lodes which were formed by the metamorphism of the rock, occasioned by the circulation of water through the joints, having mineral matter in solution; and many of the mining districts in Colorado and Montana offer examples of lodes which have been partly formed by this same cause—impregnation of the rock beyond the limits of the vein proper, by mineral matter, together with its partial metamorphism, combine to give it the appearance of true vein filling.

In connection with this subject I may perhaps be allowed to suggest to some of our members the desirability of obtaining some accurate data respecting the chemical composition and peculiar geological features of the hot springs which are found in many localities in this country. I might point to one spring within easy reach of Denver—at Idaho. This is a mining district and occurs in porphyry. I am not aware that there is any reliable published analysis of the water from this spring. It is rich in soda, which is probably derived from the decomposition of the felspar of the porphyry. A careful analysis of the water might lead to some points which would be of great interest to the Society.

Ten years ago a definite arsenical mineral was hardly known to exist in Colorado. The auriferous pyrites ores of Gilpin County were found to yield arsenical compounds in small quantities when roasted, but it was hardly possible to point out any well defined arsenical mineral in their ores. I have seen only one specimen of arsenopyrite from this district, and that, I believe, was found in the Kansas mine. In 1875 enargite was discovered in Willis' Gulch, near Central City; later on arsenopyrite was found in considerable quantity in the Forest Queen mine, Gunnison county, associated with proustite; and now we have the Red Mountain district, San Juan, yielding large quantities of enargite and tennantite. In all these cases I think I am

right in stating that the arsenical minerals are found in connection with porphyry. Similar conditions are also met with in Utah and Montana.

Until within the last two or three years the known occurrence of bismuth was confined to just one locality, viz : a belt of country at the head of Geneva Gulch and Hall's Gulch. Recently, however, the metal has been found in several new localities. The silver ores from the vicinity of Breckenridge, in nearly every case, contain bismuth, and some few mines in the San Juan country yield a rich bismuth-silver ore, and some very fine specimens of bismuth minerals have, within the last few weeks, been found in North Park.

The association of the metals bismuth and arsenic with gold and silver ores has the effect of increasing the difficulties in the metallurgical treatment of the ores. In the reduction of argentiferous and auriferous copper ores containing bismuth and arsenic these metals very seriously deteriorate the quality of the copper and make the separation of the precious metals more intricate and costly.

Those of us who have had the opportunity of watching the metallurgical progress of Colorado during the last twelve years cannot fail to be impressed with the wonderful advance science has made in this particular direction. A comparison of the charges made by smelters now for the treatment of a ton of ore, with the figures of ten or twelve years ago, point conclusively to the improved adaptation of scientific principles as applied to the treatment of ores. We number among our members gentlemen who are engaged in the practical reduction of metals from their ores, and I hope that the Society may be favored with papers and discussions having a direct bearing on the science of metallurgy as applied more particularly to the West.

We have peculiar facilities for studying the grouping of minerals as shown in the various districts throughout the state, and I think that there will be little trouble in preparing representative collections of associated minerals from each district. The specimens need not be large, provided they are good illustrative examples of the district, and care should be taken that varieties of gangue and rock are included in the collection.

The Society should also have, in my opinion, a metallurgical collection. With the necessary funds, which we hope to get, we can provide ourselves with cases which would contain specimens illustrating the treatment of ores, together with any curious metallurgical products which may occur from time to time.

I have endeavored to point out briefly certain fields for special study having a direct bearing on the mineral industry of this western country, and I trust that in the coming year the members of the society will devote a portion of their time to good honest work in the interests of those particular branches of science which the Society has so far made a specialty.