

MEETING OF JANUARY 2d, 1888.

ADDRESS OF THE RETIRING PRESIDENT,

P. H. VAN DIEST.

Being required to deliver an address as retiring President, I asked myself this question : What should constitute such an address? Looking over those of my predecessors and of presidents of other societies similar to ours I observe essentially but three kinds, namely : instructive, demonstrative and historical. The first treats of some special subject, giving the results of long and accurate detailed investigation to verify some theory, or to test the correctness and value of certain conclusions. The second treats of some subject of applied science which, having actuality, deserves to be widely appreciated in its true meaning and application. The last reviews the achievements and tendencies of science during certain periods or discusses the history of some society, giving hints and recommendations calculated to increase its usefulness and awaken enthusiasm. Of the three, the first is most generally preferred.

Recently when some of us were considering the nomination of a new president, a prominent member of the Society said : "Elect a member who is not a worker ; it will compel him to treat some subject in the form of an address." Aware that I contributed hardly anything last year in the form of papers, I desired to take up a subject that would be of interest to the Society and worthy of publication in our proceedings.

My first idea was to review most of the best known occurrences of gold in different formations and, as the important discoveries of late years have been in direct opposition to the dicta of authorities, as Murchison, Whitney

and others, to add descriptions of some recent finds, which came to my notice, and present new modes of occurrence, thus contributing new facts, which may be instrumental in advancing our knowledge of ore deposition.

But to describe these recent discoveries and other gold occurrences, for instance in Colorado, in detail, and to compare facts observed there with those observed by others in similar formations elsewhere, would require more solid reading than I had leisure for, and I had not investigated sufficiently in detail the places visited and could not obtain enough data concerning others not visited. Besides I was afraid that I would be tempted to jump at conclusions, without enough facts, and to attempt a plausible explanation, which the discovery of some overlooked fact would show to be incorrect and perhaps ludicrous.

So I became convinced that a president, who desires to make a good address, principally instructive, must choose his subject the day he is elected and devote every moment of his spare time to accumulating facts during the whole year of his official term, instead of postponing its preparation until the last week before the day of delivery.

You will, therefore, pardon me for offering simply a few notes on two occurrences of gold in Idaho Territory. The first of these is in Caribou Mountain. The mountain consists of limestones, slates and sandstones of the Carboniferous age, tilted less than 30° from the horizontal. These beds are metamorphosed by contact with layers of an intrusive eruptive rock. This rock occurs on the northern slope of the hill, where it, probably by movement during metamorphic action, produced large fractures or openings between the lime and sandstone beds. It was in these fractures that aqueous and acid solutions acted, carrying with them silica, sulphate of iron and gold, derived from the metamorphosed rocks. Not only were these openings filled by the precipitation of iron oxide, silica and gold out of the solutions, but part of the adjoining limestone bed was dissolved and replaced by the contents of the solutions,

which fact may explain the thickness of the ore deposits. That metamorphism was very active is shown by the changing of the slate to a clay-jasper; that lime was dissolved is evident from the many aggregations of calcspar crystals in the vein mass. The great amount of pyrites found in the country rock indicates the origin of sulphate of iron solutions, while the three principal ore deposits parallel to each other, having a thickness of 4, 12 and 25 feet respectively, do not show any pyrites, but a great amount of limonite and specular iron. Placers have been and are still profitably worked within a very short distance of the outcrops of the rich ore beds. I observed there, as elsewhere, that the richer and more extensive the gold veins, the nearer the placers are. Less distance was there needed for natural concentration than in workable placers of gold derived from the crumbling of thin and poor veins.

Another interesting deposit is found in the Wilson mine at Wagonton, Idaho. The gold in unusually large quantities occurs there in wide streaks of a talcose or a friable sandy material, or in a decomposed porphyry, separated by what the miners call "horses." It is possible that these "horses" are parts of the country rock, a porphyry, and that the space between the joint and cleavage planes were widened by the action of solutions replacing such widened spaces by the gold-bearing material.

A discussion of the principles of ore-concentration and the economic importance of a more extended introduction of concentration works would be a timely subject for an address of the second description.

Since railroads traverse the mountains in different directions, milling, at least of silver ores can no longer compete with smelting. While in 1880 two-fifths of all the ore produced in Colorado was treated in mills, now only a few gold mills are in operation. It is true that several silver mills have been changed into concentrating mills, but nearly all of these do custom working, the bulky low grade ores being transported a greater or less distance to

them. It would be far more economical to concentrate these ores as near as possible to every important mine. It often occurs that concentration works are filled with costly machines which are seldom fit for the class and grade of ores to be treated. In general, not the slightest regard is given to classification. The custom is to employ a single machine, that must be capable of separating all kinds of metalliferous minerals from non-metalliferous material, or gangue, without any other sizing than to make the ore particles smaller than the openings of a screen placed before a stamp battery or a pulverizer. Nearly all of these machines require that the ore be stamped to a fine pulp. In this way slimes are created, and with them an unnecessary loss of mineral occurs. When a mass of mixed materials is lifted by a current of water or air, the particles specifically heaviest will drop down first, *provided* these particles are all of the same size. A lateral current will move lighter particles farther than the heavier ones, *provided* again that all these particles are of the same size. The separate or combined action of vertical and lateral currents regulates in any case the complete separation. These and other principles are but vaguely understood, not only by those who superintend concentration works, but also by the inventors of much advertised, new or improved machines. Simple machines of different forms, jigs, buddles, tables, etc., each adapted to a special class and size of the ore, intelligently applied in connection with rigorous sizing give the best results and can be advantageously adopted at almost every mine. Even a change in the character and form of ore in the mine can be easily accommodated by using a larger number of one or another class of these simple and inexpensive machines.

To demonstrate in a popular way that now, more than ever before, there is a necessity for almost every mine to have a concentrating plant; to explain the best and most economical principles on which the construction of such a plant must be based, in a way that will attract the attention

of those engaged in the mining industry, and thus to diffuse sound ideas about concentration outside of this Society, requires more experience than I possess and more study than I could apply.

Thus nothing remains for me but to offer a few brief remarks in regard to the standing and prosperity of our Society. Mr. Emmons said in the meeting of organization, December, 1882, that "it seemed to him that the time had come for those persons in Colorado, who were interested in true science, to unite in forming an association or society, whose immediate object should be to facilitate the interchange of scientific observations and ideas, and to record and publish the many interesting facts, which are daily observed in different parts of the State. The opportunity thus afforded through the medium of a society would act as a stimulus to some to pursue investigations in directions specially open to them." To what extent we have in the five years of our existence responded to this programme or fulfilled this mission is best known to those who have either been directly identified with its active work, or who have felt sufficient interest to habitually attend the meetings. Such are aware of the many interesting papers on veins, rocks and minerals, their appearances, their composition and their formation. Such are aware of the creditable extent of our collections. To review the history and work of the Society for the information of those who have had the least opportunity to learn them is hardly necessary.

The three numbers of our proceedings, already in print, give evidence of our work and of the untiring perseverance and devotion of several members to the purposes of our organization. The fourth number, which will contain the papers read in the meetings of 1887, will no doubt excel in quantity and quality, what is recorded of previous years, and I have the assurance that these proceedings will appear in print earlier in the year than previous volumes have done, and will thus better satisfy the interest of outside members, who were unable to attend meetings.

To those who have read our proceedings and attended meetings, it is obvious that the greatest number of papers and the best have been contributed by those members of our Society who are in the employ of the United States Geological Survey. They have opportunities which most of the other members lack, the chance to give time to the study of a special subject and the facilities to execute necessary experiments and tests. The Society, founded to a great extent, by the members of the Geological Survey, has grown under their guidance and with their aid. We have heard with great regret that the office of the United States Geological Survey in Denver is abandoned, and that all the members of the staff of the Rocky Mountain Division are called to Washington. We all consider this a great loss to our Society, for although the parting friends will not forget us and occasionally will send contributions to our proceedings, they will not be able in the future as in the past, to read us papers of special interest for Colorado.

The name Colorado Scientific Society carries with it a general idea of its ends; an association for acquiring and systematizing a knowledge of nature, as revealed more especially within the State of Colorado, or to give it a somewhat wider scope, the Rocky Mountains.

It is true that minerals and ores are the principal topics of scientific interest in Colorado, but they are not the only ones, and the members who leave us are not the only workers of our Society; several others have been willing to work wherever they were most needed, and they, too, have labored steadily, so that our Society has become noted outside of Colorado. Other branches of science than chemistry and mineralogy, for instance ornithology, botany, zoology, physics, etc., are not excluded from the aims of our Society. How hungry our museum looks for specimens of plants, mammals, etc. These branches will receive in future some attention, especially from new members.

Metallurgy has not been touched upon in any of our papers, notwithstanding the appeal made in the address of Mr. Pearce, two years ago, when he said : " 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, 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." I am convinced that the several members of our Society, who are engaged in metallurgic pursuits, will favor us with papers on this important subject.

It is true that we shall have many obstacles to encounter in the future execution of the aim of our Society, but such have existed before as well. A great obstacle is, no doubt, that with a good membership as to numbers, there are always but a few, who are in circumstances to render any considerable material aid. Few of us are by habit and occupation prepared to engage in original investigation, but all can aid in discussing the merits of a new theory, or a subject of local interest and all can contribute to our museum and stir the interest of others in that direction. Another reason for slow progress is the indifference and lack of sympathy of the community. We have felt once a faint ripple of an approaching tide of popular sympathy stirring our feet. Some subscriptions were received from outsiders for our museum fund, but it has not become a great wave. Our cases still lack many typical specimens of ores and rocks. How long shall they remain so unsupplied with many kinds of crystallized minerals, and also of plants particularly belonging to Colorado? Our members can answer only part of this question. The community must answer the greater part because the collection of such typical specimens requires money. The highest possibilities in this regard demand the sympathy and coöperation of the intelligence and wealth of the community.

The reason for the existing general indifference to a museum is that most persons, however well informed, who are not engaged in scientific investigations, do not fully appreciate the importance and value of contributing to a fund for enlarging collections. A museum representing the minerals and products so closely connected with the main industries of Colorado is absolutely necessary to Denver and must naturally be in the custody of an association such as ours. I am assured that, if, aside from other considerations, our citizens could be made to fully realize this alone, they could not remain indifferent. We must all coöperate to arouse enthusiasm among our wealthy fellow-citizens, and also to increase ambition among ourselves. Then days of greater achievements will dawn upon us and awakened interest will become materialized to a degree which will assure to this Society a wide range of usefulness.