MEETING OF JANUARY 4th, 1886.

ADDRESS OF THE RETIRING VICE-PRESIDENT,

P. H. VAN DIEST.

Gentlemen:

With great regret we heard, at the November meeting, that our President for 1885 was called to Washington. To lose such an active member at any time is indeed a source of regret. And to-night, when, according to a time-honored custom, we expect an address from the retiring President, we miss him the more, for Dr. Hillebrand would not have failed to deliver an interesting discourse. In his absence I ask your indulgence for a few remarks on matters pertaining to our Society, and for a short review of the progress of a few branches of science during the past year.

Mr. Emmons, in his address of two years ago recommended that we try to obtain from the State Legislature a kind of official position, bearing possibly a similar relation to the State Government as that which the National Academy bears to the General Government. The suggestion was acted upon by the drafting of a bill embodying this idea, which was presented to the Legislature in last year's session by one of our members, but it failed to pass. It seems to me that, in the interest of the State, more, perhaps, than in our own, we must not let this matter rest, but should renew our endeavor when the next Legislature meets, hoping for better success. We shall then be able to make a better showing for ourselves, and to indicate what may be expected from us as advisers in various matters of importance to the public welfare.

Our collections of rare and of typical minerals will soon have grown sufficiently to foreshadow the benefits to be derived from an extensive mineralogical museum in the

State. When we see that cities of less importance than Denver, in America as well as in Europe, possess such museums, then it is plain that a State so rich in mineral-products must not be any longer without a cabinet worthy of the study of learned travelers and the careful attention of all.

In our endeavors to interest public spirited citizens in our behalf we have allies in men long passed away, but whose words are yet living as axioms, not to be refuted. Prince Albert of England laid down the doctrine that Science should speak to the State as a favored child to its father, sure of a paternal solicitude for its welfare, and that the State should recognize in Science one of the elements of its strength and prosperity. No less a man than the great Washington said: "Promote as an object of primary importance institutions for the general diffusion of knowledge. In proportion as the structure of a government gives face to public opinion, it is essential that public opinion should be enlightened."

Each observer of a field of scientific or technical interest, must, from time to time, feel depressed under the difficulty if not the impossibility of keeping himself posted in what the world is accomplishing even in his own special branch of science. A complete enumeration and discussion of the advances in the varied branches of science during the past year would require the coöperation of several of our members, and it would tire you before half gone through with. Therefore I will only try to point out the tendency of a few branches, which most interest our members, and to show wherein we might be of use to the State in giving advice as to the value of new applications of scientific principles, and in guarding against exaggerations and falsification of facts.

In Chemistry the tendency was, perhaps more than in previous years, to discover the laws which govern the changes in constitution which bodies may undergo. Determination of composition is doubtless the most important work of the analytical chemist, but the discovery of the laws governing changes is the highest object of chemistry in general. This study is of great aid in enlarging the practical applications of chemistry in the Arts and Industries.

The manufacture of oxygen as introduced this year by Brinfrères is to some extent a revolution, as it reduces the cost of production to a trifling sum. An anhydrous oxide of barium absorbs oxygen from the air, and then gives it up again on heating, while the lung remains indestructible by the process.

Chlorine is manufactured according to a new and cheap method which consists in the addition of magnesia to a concentrated solution of magnesium chloride, treated by air and heat, thus liberating all chlorine while the residue, magnesia, is used over again.

A new and cheap method of producing hydrogen gas was also introduced last year. It consists in directing jets of superheated steam upon incandescent coke. A ton of coke may thus be used to produce 96,000 cubic feet of gas, at an expense of $\frac{1}{10}$ cent per thousand feet.

A new analytical method for the separation of zinc, of use in testing blende, consists in changing all metals present into formiates, then sulphurreted hydrogen is passed through, which, by excess of formic acid precipitates the zinc only.

Chemistry has aided in preparing a new porcelain, at the establishment of Sèvres, which is identical with the finest kinds of china ware, lending itself to artistic decorations. A new ceramic product was made of the waste sand of glass factories, by means of high pressure and a great heat.

Nobel has by chemical appliances perfected explosives, and a new explosive called romite has been invented in Sweden. The latter will not explode even under great pressure unless ignited, it does not freeze, has great power, and can be made at low cost.

A chemical study of Yucca angustifolia was made by Miss Helen C. D. Abbott, resulting in the discovery of two new resins and a new gum. Introducing the name of one lady into my discourse I cannot forego the pleasure of naming another, who has in the past year contributed to the advancement of Science, although in another field than Chemistry. Miss Marie von Chauvin has, by means of many experiments on amphibians shown the great influence of the surrounding medium upon the organization of animals. She converted an aquatic Axoloth, breathing by means of gills, into the terrestrial Amblystoma, which breathes by means of lungs, and the reverse.

In regard to Mineralogy I will only mention that several new species were discovered during the year, two of them by members of our Society, while better determinations and classifications of many known minerals were given.

A new element called Norwegium was discovered. It is malleable, white in color, hard as copper, has Sp. Gr. 9.4, and melts at 380° C. It was found in a nickel ore from Norway.

The low prices of iron and steel during the past year made producers keen in inventing methods of cheaper production, by using less fuel for the same amount of product, and by adapting the product more nearly to the requirements of different industries. The Clapp-Griffith process for making mild steel made favorable progress, as did the Thomas-Gilchrist process. The output of Bessemer steel has been increased to more than 4,000 tons per week from a single pair of 7 ton convertors. A compromise system between the Bessemer and crucible processes of steel manufacture, a kind of direct process, was successfully started last year in Manchester, England.

Mild steel ties have come into use on all the State railroads in Holland, and in England, and were used extensively in the construction of ware-houses.

In the reduction of other metals than iron considerable progress has been made, notably in the case of copper. Magnesium is produced now at low prices and in large quantities, in France.

New metallic alloys were made by Prof. Thurston, and Mr. Pearce has made interesting studies on gold and bismuth alloys and their properties.

Aluminium was last year produced in quantity by electrolysis, and in general the commercial applications of this method made steady progress, principally in America.

Electricity was for the first time employed to generate intense heat in its passage through a resisting medium, in order to reduce refractory ores. Messrs. E. & A. Cowles used electric furnaces for that purpose and for the production of alloys of magnesium, aluminium, manganese, silicon and boron with copper and other metals. Electricity was also used to decompose a solution of salt, producing caustic soda and chlorine gas. Salt in connection with fat produces in this way soap, glycerine and chlorine gas, the latter being used in bleaching. Other applications of electricity also made marked progress last year. Electricity is now employed in perforating glass, cutting tubes, heating railway trains, correcting the weight of coins, etc., etc.

Imperfect knowledge of the surface and structure of the world on which we live is a great hindrance to development in many ways. Our modern life cleaves so close to the earth, that we need a greater amount of accurate information concerning it than did our forefathers. Much was done in 1885, perhaps more than in previous years, to increase our knowledge in this direction. Great activity was displayed in geographical and geological researches.

To begin at the North, we observe that the geology of the Hudson's Bay region has been studied, and of this we find details in Dr. Bell's report. Nordenskiöld's arctic investigations contribute much to our knowledge of this cold region, while Lieut. Greeley's maps are important additions to geography, and his articles have told us much of the glaciers of the polar region. Our information concerning the geography and resources of Alaska was much increased.

The Tertiary phosphates of Alabama were analyzed and their occurrence studied. The Falls of Niagara were considered as a chronometer and as a source of electrical energy. The knowledge of the geology of Wisconsin and of Virginia was materially advanced. Natural gas wells in the eastern United States were carefully studied from the Geological point of view.

The central and western portions of Brazil were explored by Dr. Karl von Steinen. Additions to our knowledge of the geography of Central Asia were made by expeditions following to the sources of rivers and along mountain chains. The Russian Ambassady to Afghanistan gathered valuable data concerning the races of Central Asia, as well as of the geology of the Afghan boundary. New routes of travel into the interior of western China were followed and the country explored.

Geological changes in New South Wales were studied, and the former existence of a glacial period in Australia was established.

The geological bureau of Japan prepared last year a series of maps of the Japanese Archipelago. Of the utmost importance to Japanese agriculture is the investigation of the extensive uncultivated plains of volcanic tufas. The origin of earthquakes also received careful attention. The volcanic theory has been rationally limited and the orogenic theory, which regards earthquakes as the effects of dislocations due to mountain growth has been much developed, a gain for physical geology.

The investigations made at the scene of the disasters caused last year by earthquakes in Spain, showed that these disturbances were due to local causes. Faulted, folded, or overlapping, strata gave way through weakness caused by the solvent action of waters, or by some displacement at great depth.

The observations in regard to the velocity of seismic waves, carried out at the time of the Flood Rock explosion, showed that this speed was much greater than has been heretofore admitted.

The classification and palæontology of the Tertiary deposits in the United States were subjects of unusual attention and discussion. Fossil scorpions were found in three distinct and widely separated parts of the world, in older strata than they have previously been found in.

The geology of the Comstock lode has been given a new aspect by the work of Messrs. Hague and Iddings of the U. S. Geological Survey.

The nature and extent of metamorphism of rocks is becoming better known and the application of petrography to the determination of the age of eruptive rocks has received a severe blow through the works of Hague and Iddings. The result of their studies, and of other recent observations, is to practically revolutionize certain geological fields.

In regard to the manner of the deposition of ores in veins there has likewise been a great deal of new and interesting information brought out within the year. Mr. Emmons' publication on the Leadville ore deposits is an example.

Mr. Hills has given us a study of the phenomenal ore-deposits of Summit District, but the problems of vein filling are here so much more diversified than elsewhere that a more extensive study of the different forms of ore-deposition is of the greatest interest for Colorado. The activity of the mining man is not confined to the exploitation of ore-deposits. He has also to discover and examine them and even in the exploitation a knowledge of the nature of the deposits is highly important. It is a subject that might be investigated by our Society. A committee could be appointed to gather data from observations made by others, living in the mining districts. This could in course of time form a code of vein studies for Colorado similar to that given us by von Cotta from different parts of Germany.

I do not wish to collect data by questioning miners; they have only a practical knowledge of a small area and they can but give the most contradictory and unsatisfactory evidence. I wish to have the questions put to Nature, and this will give fruit. It may seem practical to question the miner, but the returns will be untrustworthy. It may be abstract to question Nature, but this is found to be the surest road to positive knowledge, and hence to the best results.