THE GIANT WHEEL OF PARIS.

The newspapers recently informed us that a trial of the gigantic wheel had been made in the presence of M. Blanc, prefect of police.. An emulator of the 300 meter tower erected upon the Champ de Mars, this apparatus is commonly styled the "Great Wheel of Paris." It stands on Avenue de Suffern, opposite the celebrated gallery of machines of the Exposition of 1889. The idea of such a construction is due to Mr. Graydon, an officer of marines of the United States navy, who took out a patent for it in 1893. The present project emanates from an English society. The operation of mounting took place under the direction of Mr. Slitkins, an English engineer. The general work of construction, the installation of the material necessary to revolve it, and the lighting of it were confided to Mr. W. B. Basset. The first wheel of this kind was constructed for the Chicago Exhibition, but it did not attain the dimensions of the one under consideration.

The metal entering into the structure of the French wheel is steel, furnished by the Société des Forges et Acieries de Haumont (Nord). The weight of the metal employed is no less than 800 tons.

The wheel is designed to revolve around a horizontal axis situated at 220 feet above the level of the ground, and moving in two bearings that rest, through the intermedium of a heavy oak beam, upon two frames. At its periphery there is a series of cars that are carried along in the rotary motion of the apparatus.

The diameter of the wheel is exactly 93 meters (305 feet). At the lowest level to which the cars can descend they will be 10 feet above ground, and the highest point that they will reach will consequently be 315 feet above the surface. Between the two external fellies are suspended a certain number of cars designed to be used as saloons, parlors, dining saloons, reading rooms, concert halls, etc.

The total weight of the wheel, inclusive of the empty cars and exclusive of the axis and frames, is 1,430,000 pounds. The axis weighs 79,200 pounds and the two frames 873,400. The total weight of this architectural monument is, therefore, 2,382,600 pounds. Each car is capable of accommodating 30 persons, and the number of cars is 40. Supposing the average weight of each passenger to be 154 pounds, the total load upon the foundation will be 1,167 tons.

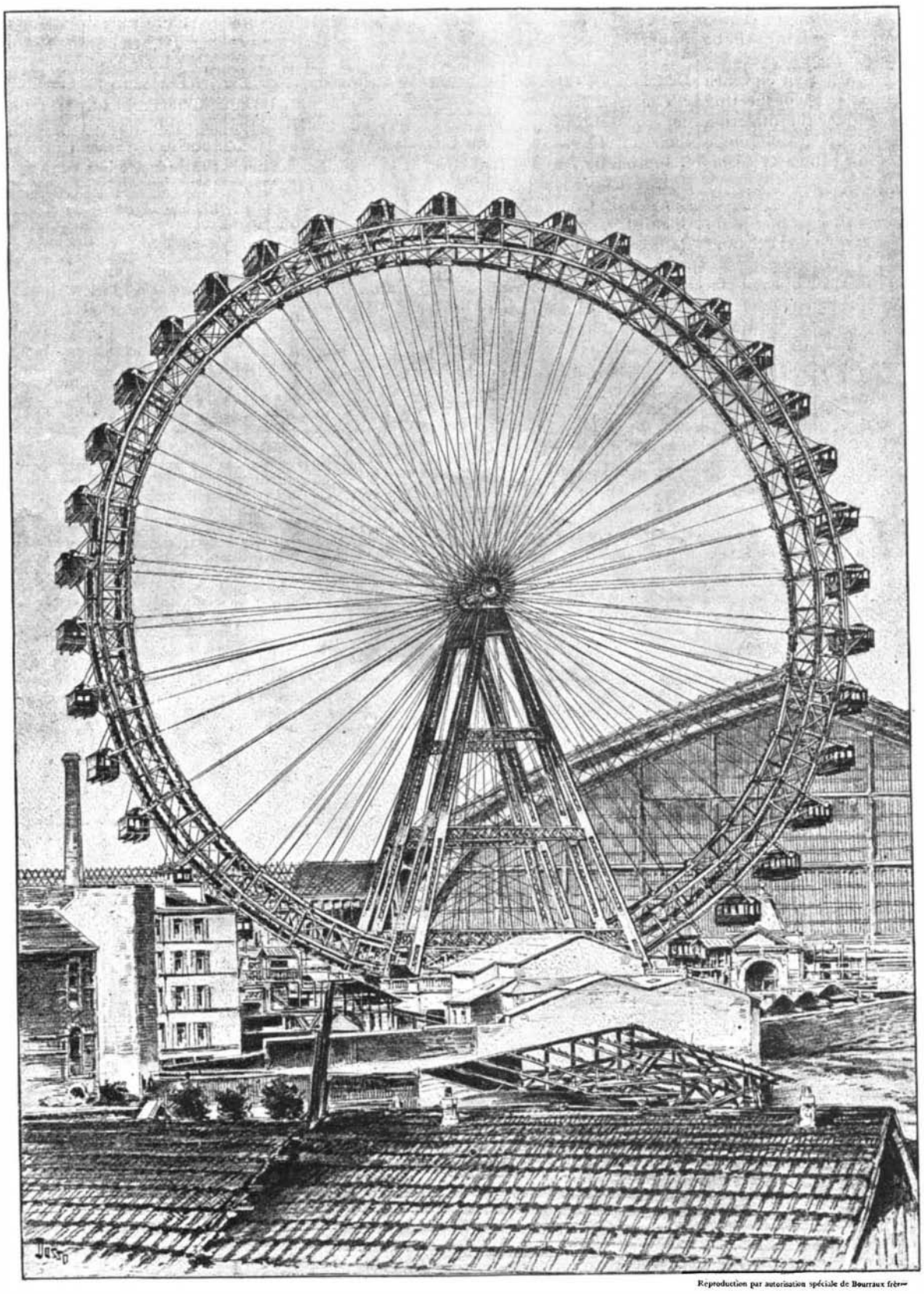
The foundation is of concrete made of Portland cement. Two excavations, 18 feet square and 39 feet deep, were made in the earth and were filled with a mixture of sand, pebbles, and pure cement without the addition of any hydraulic lime. Each of the monoliths thus formed has a weight of 230 tons. It is upon these beds that rest the two steel frames that support the wheel. Each of these frames consists of four lattice girders connected by heavy steel cross braces and diagonal tie beams. They were mounted in detached pieces that were bolted and riveted together.

The axis, which is of first quality Martin steel manufactured in England, is a heavy hollow piece about 50 feet in length and of an external diameter of 36 inches.

The shaft revolves in steel bearings lined with a metal of peculiar composition—a mixture of lead, tin, and various other substances. This alloy is designed to prevent the friction of steel upon steel, the coefficient of which is very high. From each side of the axis radiate 160 flexible cables of steel wire 2 inches in diameter, which are attached to the fellies of the wheel and are provided with stretchers for stiffening them after being put in place. The rotary motion of the wheel is obtained through a double cable, which embraces it and winds around windlasses actuated by a 120 horse power steam engine. The security of the operation of the apparatus is assured by several instantaneously acting brakes, which also control its motion. The engine also runs a dynamo, the current of which will supply arc and incandescent lamps.

The electric communications, starting from the ground, are effected through cables that follow one of the frames and end at the axis. From this point the current is transmitted to the periphery by cables, and to the different posts of electric distribution by circular plates and contact brushes. The processes of illuminating every part of this huge structure furnish a means of obtaining all the plays of light desirable. As the wheel revolves, the shining of the lamps in space will give it the aspect of a piece of fireworks. The wheel makes one revolution in twenty minutes, inclusive of stoppages. Access to the cars is obtained through a system of stairways and landings so arranged that eight cars can be filled and emptied simultaneously, without any blockade, in less than one minute. Each car is 42½ feet in length.

For the above particulars and the illustration we are indebted to the Encyclopédie du Siècle.



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THE GIANT WHEEL OF PARIS.

A New Chemical Element.

Dr. Becquerel has announced to the Academy of Sciences at Paris the discovery of a new supposedly elementary substance which has a close affinity to barium. The correspondent of The New York Sun who cables the news states that its discoverers, MM. Curie and Bremona, have named it "radium." It is so sensitive to light that it will take photographic impressions.

Great Consumption of Quinine in America.

It is estimated that, during and since the war with Spain, over 125,000,000 grains of quinia have been issued to American soldiers suffering with fever. In some cases men who were in the hospitals were dosed with as much as 300 grains per week, and almost every man in the army took the drug at some period of his service, either for its curative or preventive effect. Yet, as large as these figures are, they are hardly as surprising as those for the entire population of the United States. We are a race of quinine eaters, and the people of this country consume one-third of the quinine of the world. Although such doses as prevailed in Cuba and Porto Rico are seldom taken in the States, there are few people here who do not at some time during the year take quinine in some form or other. The drug is used in the preparation of many patent medicines, tonics, bitters, cold cures, etc.; even in hair tonic for external application. The official figures of the Treasury Department show that last year there were imported into the United States 1,539,056,750 grains of quinia. This means a consumption of something like 20 grains for every man, woman, and child, as there were practically no exports of this article.

The cinchona tree, which furnishes quinine, Peruvian bark, and calisaya bark, is a native of the western South American coast countries, more particularly Peru; yet but a comparatively small portion of the world's product now comes from that region. For many years all the quinine of commerce came from the wild trees of Peru, but with the present great demand, the refined product obtained from the wild trees of its native habitat would supply but a small proportion of the world's requirements. At the present time two-thirds of the quinine used is produced in Java, an island of the East Indian archipelago, corresponding closely in size to Cuba, and having with it many features of soil and climate in common. The history of cinchona culture in Java is interesting. For thirty years the Dutch government, which owns Java, was urged to undertake in the island the introduction of this plant from Peru, and finally, in 1852, it employed the botanist Hassharl to explore the cinchona forests of Peru. He procured a large number of varieties and took them to Java, where plantations were started, which have succeeded to the extent already indicated. The government of India was not to be behind in this matter, and the cinchona plantations and factories of that region produce now their share of this important drug. The importance of sending trained explorers to find and import new and rare plants is shown in the early efforts of the Indian government to secure cinchona trees. Seven years of governmental correspondence failed to secure a single living plant of this species, when the government engaged Clement R. Markham to visit the mountains of Peru, at the risk of his life, and he succeeded in establishing in the British East Indies in a single year 9,732 cinchona trees.

The price of quinine has, of late years, steadily decreased, so that now it is considered a cheap drug. In 1897 the import price in the United States was a little over sixteen cents per ounce. When it is considered that an ounce avoirdupois contains 437½ grains, it is seen that the quinine in a dozen 2-grain capsules does not cost much. The total value of refined quinine and cinchona bark imported into the United States last year was $725,457.

Meetings of Scientific Societies in New York.

Five of the eleven scientific societies which met in New York during the holidays for their winter meeting held their sessions December 28 in the halls of Columbia University, while others met at the College of Physicians and Surgeons and other places. Prof. W. J. McGee delivered an interesting address before the Anthropological section of the American Association for the Advancement of Science. Perhaps the most exhaustive philosophical paper of the section was presented by Major J. W. Powell, Director of the Bureau of American Ethnology. Major Powell's subject was "Aesthetology, the Science of the Senses." Mr. James Mooney, of the Bureau of Ethnology, gave an account of the Indian Congress at Omaha during the Trans-Mississippi Exposition. From an ethnological point of view, he said, the congress was not what was expected. There were twenty tribes and twenty-five languages represented, but most of them were Indians of the plains. Several other papers were presented and the section adjourned. The next meeting will be held in Columbus, Ohio.

The American Folk Lore Society held their eleventh annual meeting in Fayerweather Hall. The meeting was enlivened with Indian songs under the direction of Alice C. Fletcher and others. The graphophone was used to present an Omaha war song. It seems that the modern talking machine is of considerable use to folk lorists. Prof. Henry Wood, of Baltimore, President of this Society, delivered an address on "Folk Lore and Metaphor in Literary Style," and other papers were presented.

The Geological Society of America opened its eleventh annual meeting on December 28 in the large lecture room of Schermerhorn Hall and was welcomed to the University by President Low. Prof. J. J. Stevenson, of the New York University, President of the Society, presided, and after the transaction of business, the vote for officers for the ensuing year was announced. The following were elected: President, Benjamin K. Emerson, Amherst, Mass.; First Vice President, George M. Dawson, Ottawa, Ont.; Second Vice President, Charles D. Walcott, Washington, D. C.; Secretary, H. L. Fairchild, Rochester, N. Y.; Treasurer, I. C. White, Morgantown, W. Va.; Editor, J. Stanley-Brown, Washington, D. C.; Librarian, H. P. Cushing, Cleveland, O.; Councilors, W. M. Davis, Cambridge, Mass., and Joseph A. Holmes, Chapel Hill, N. C.

A memorial of the late Prof. James Hall was read by Prof. Stevenson, who then proceeded to deliver the President's annual address to the society.

A large number of papers were read on this and ensuing days. The annual dinner took place on Thursday, December 29.

In the rooms of the Department of Psychology, Schermerhorn Hall, the American Psychological Society opened its seventh annual meeting and proceeded at once with the reading of papers, Prof. Hugo Muensterberg, of Harvard, presiding. The papers presented were, in part, as follows: "The Development of Voluntary Movement," E. A. Kirkpatrick; "Report on the Effects of Cannabis Indica," Prof. E. B. Delabarre; "Certain Hindrances to the Progress of Psychology in America," Prof. George T. Ladd; "Reason a Mode of Instinct," Henry Rutgers Marshall; "Nature of Animal Intelligence and How to Study It," Prof. Wesley Mills; "Psychological Classification," Miss Mary Whiton Calkins. Prof. Hugo Muensterberg, the President of the association, delivered the annual address, taking as his subject, "Psychology and History." An interesting discussion on the "Relations of Will to Belief" was arranged for.

In the same building the Society of Plant Morphology and Physiology also held their session, and, after a brief business meeting, the reading of papers was begun. Papers were presented by Dr. W. W. Rowlee, of Cornell University; Dr. J. W. Harshberger, of the University of Pennsylvania; Dr. W. F. Ganing, of Smith College; Prof. B. D. Halsted, of the New Jersey Agricultural College; F. E. Lloyd, of the Teachers' College; Charles H. Shaw, of the University of Pennsylvania; R. E. B. McKenny, of the University of Pennsylvania; Miss Amelia B. Smith, of the University of Pennsylvania; Dr. M. A. Howe, of Columbia University; Dr. Henry Kraemer, of the Philadelphia College of Pharmacy.

The American Morphological Society met in the zoological lecture room. Prof. Henry F. Osborn, of Columbia University, presided. Among the papers read were: W. Patten, "Gaskell's Theory of the Origin of Vertebrates from Crustaceans;" Rashford Dean, "Notes on Myxinoid Development;" F. B. Sumner, "Notes on the Early Development of the Catfish;" J. Reighard, "On the Development of the Adhesive Organ of Amia;" W. E. Ritter, "On the Reproductive Habits and Development of the California Land Salamander, Autodax" (presented by G. H. Parker); C. H. Minot, (1) "Notes on Mammalian Embryology," (2) "Prof. O. Van der Stricht's Researches on the Human Ovum, the Nervous System of Amphioxus, and the Development of Thysanozoon," with demonstrations; S. P. Gage, "Notes on the Morphology of the Chick's Brain;" W. A. Locy, "Review of Recent Evidence on the Segmentation of the Primitive Vertebrate Brain;" C. J. Herrick, "Metameric Value of the Sensory Components of the Cranial Nerves;" W. A. Locy, "New Facts Regarding the Development of the Olfactory Nerve;" N. R. Harrington and E. Leaming, "Action of Different Colors upon Protoplasmic Flow of Amoeba."

The eleventh annual meeting of the American Physiological Society also took place in the physiological laboratory and a number of papers were presented.

The annual meeting of the American Mathematical Society was held in Fayerweather Hall in the lecture room of the Department of Physics. Among the papers presented were the following:

"On Multiple Resonance," Prof. M. I. Pupin, Columbia University; "On the Development of the Perturbative Function in Terms of the Eccentric Anomalies," Dr. A. S. Chessin, New York; "On Some Points of the Theory of Functions," Dr. A. S. Chessin, New York; "On the Transformation of Straight Lines into Spheres," Prof. E. O. Lovett, Princeton University; "A Generalization of Appell's Factorial Functions," Dr. E. J. Wilczynski, University of California.

The American Chemical Society also accepted the generous hospitality of Columbia University for their meeting. The chemists were welcomed to Columbia by President Low, and the meeting was held in Havemeyer Hall. They were also welcomed by Prof. Charles F. Chandler, the head of the Department of Chemistry, and former President of the Society. Papers on various industrial and scientific subjects were read, and the members were entertained at luncheon in the laboratory of Columbia University.

The meeting was held under the direction of Dr. Charles E. Munroe, President.

One of the interesting features of the session was a paper by A. C. Langmuir, the subject being "The Determination of Arsenic in Glycerine."

F. W. Clarke read the sixth annual report of the committee on atomic weights. "I have here," he began cheerfully, "forty pages, mostly figures"—a sigh of profound resignation from the chemists—"which I don't propose to read." This assurance caused the body of scientists to thaw with a celerity hitherto unapproached. The speaker said that fully two-thirds of the work on atomic weights of the year 1898 had been done in this country. When he had finished, Dr. McMurtrie moved that a committee of five be appointed to confer with committees which might be appointed by other chemical associations of the civilized world, and endeavor to agree on a uniform standard of atomic weights. The chair later appointed the committee.

The Society attended a lecture by Charles E. Tripler in the College of the City of New York, and some intensely interesting experiments with liquid air were shown.

The most novel one, conducted by Prof. R. Ogden Doremus with liquefied oxygen, furnished by Mr. Tripler, was placing the oxygen in a cup just below a huge magnet and witnessing its attraction by the magnet. As the shadow of the gas was cast by a calcium light on a white screen, it was seen to leap up to the magnet. "This," said Prof. Doremus, "is Faraday's experiment, proving oxygen to be magnetic."

In the evening the Society dined at the Waldorf-Astoria, Dr. William McMurtrie, chairman of the New York section, presiding. Among the various toasts was one responded to by President Seth Low, of Columbia University, on "Our Higher Education." He said in part: "The development of higher education means much for mankind, because institutions of higher teaching are giving opportunity to men to become acquainted with new laws of nature. That is my appeal for your support of the higher education."

A union meeting of all the scientific societies was held in the evening at the American Museum of Natural History, all of the various societies being the guests of the American Society of Naturalists. The members of the Society roamed at will through the great halls until they were summoned to the large lecture hall, where an address of welcome was delivered by Mr. Morris K. Jesup, president of the Museum. He predicted that the time would come when New York would take her proper place in the scientific world as a scientific and educational metropolis. Prof. Osborn also made an address, and a reception at Prof. Osborn's residence followed.

The meetings were continued on December 29, and a large number of interesting papers were presented, but space forbids even a list of titles. The annual meeting of the Society of Naturalists, with which the societies representing the special branches are affiliated, was held in Schermerhorn Hall, and President Low welcomed the members with an appropriate address. W. G. Farlow, of Harvard, was elected President; H. C. Bumpus, of Brown University, Vice President; T. H. Morgan, of Bryn Mawr, Secretary; and J. B. Smith, of New Brunswick, Treasurer. The general meeting took for the subject of joint discussion "The Advances in Methods of Teaching." The third annual meeting of the State Science Teachers' Association took place in the Teachers' College, in the morning, President Low welcoming them. In the evening a reception for the stranger teachers was given by the Trustees of the College. The annual dinner of the American Society of Naturalists was held at the Hotel Savoy, Prof. H. P. Bowditch, Dean of the Harvard Medical School, presiding, and he delivered the annual address as President.

The Export Trade for the Year 1898.

The exports from the United States for the calendar year 1898 will exceed those of any year. Only twice in the history of American commerce have the exports of a year passed the billion dollar line, but in 1898 they will reach the enormous sum of a billion and a quarter, the total for the first eleven months of 1898 being $1,117,681,199, and it is apparent that the December statement will bring the grand total of the year above $1,250,000,000. The figures of the Treasury Bureau of Statistics show that the November exports are not only the largest in November, but the largest in any month in the history of our commerce; while, as already indicated, those of the eleven months ending with November are larger than those of any full calendar year prior to 1898.

The import record of the year 1898 will be as remarkable as those relating to its exports; but, of course, by reason of a decrease, the total imports of the year are less than those of any calendar year since 1885. For the month of November they were $52,109,560, which was slightly less than those of November, 1897. For the eleven months ending with November they were but $579,844,153, while those of the corresponding months of 1897 were $691,089,266, which makes it apparent that the imports for the full calendar year of 1898 will not exceed $640,000,000—a sum less than the calendar year of 1897 and fully $100,000,000 less than that of the year 1897. With the largest exports in our history and the smallest imports for many years, the year 1898 will naturally show the largest balance of trade in our favor ever presented in any calendar year. The figures for the eleven months show an excess of exports over imports amounting to $537,837,046, and it is quite evident that the December figures will bring the total of excess of exports for the calendar year above the $600,000,000 line, making an average excess of exports for the year more than $50,000,000 a month, while the highest excess of exports in any preceding calendar year was $357,090,914 in 1897 and $324,263,685 in 1896.

A "Bacteria" Engine.

N. P. Melnikoff, the editor of the Russian journal Technologue, published at Odessa, informs us that he has made a little model of an engine which depends for its motive power upon the fermentation of bacteria. Although the engine in itself has no practical value, it nevertheless furnishes an interesting example of the power which can be derived from fermenting bodies. Mr. Melnikoff decomposes glucose into its constituents.

Glucose Alcohol Carbon dioxide

$$C_6H_{12}O_6 = 2C_2H_6O + 2CO_2$$

One hundred and eighty parts of glucose will give ninety-two parts of alcohol and eighty-eight parts of carbon dioxide gas. In a copper vessel, glucose, an acid phosphate, acetic acid, gelatine, water (75 per cent), and yeast, are mixed together. After twenty-four hours, the gas within the vessel, at a temperature of 20° C., will have attained a pressure of four and one-half atmospheres. The inventor states that, if the vessel containing the yeast-bacteria be large, and the engine cylinder be correspondingly proportioned, enough power can be obtained to operate an engine uninterruptedly for twenty or thirty hours. The fermentation of different bacteria will give different results, the power produced depending upon the quantity of carbon dioxide or other gases generated by each species of bacteria. Mr. Melnikoff is at present engaged in experimenting with bacteria giving ethylene, hydrogen, and other gases.

Aconcagua Again Ascended.

Sir William Conway has been the third to ascend Aconcagua. He reached the summit on December 7, and was four days in making the ascent. The weather was perfect, and in this respect the ascension had a great advantage over Fitz Gerald's party of 1896-97. No particulars of Sir William Conway's trip are available as yet. He has now gone to Terra del Fuego, where he hopes to reach the summit of Mt. Sarmiento, the high peak on the south coast. A number of early attempts to conquer Aconcagua have failed, but Mr. Vines and the Swiss guide Zurbriggen succeeded in making the ascent. The leader of the Fitz Gerald expedition did not reach it. Aconcagua is entirely in Argentine, and is in plain view from the Pacific. When Mr. Vines was on the summit of Aconcagua, the thermometer registered thirty-five degrees below the zero point. He found at the highest point an almost square platform, extending about 225 feet on all sides, and sloping slightly to the north. To the south and southwest the sides were precipitous, and to the southeast there is an enormous precipice of nearly 10,000 feet, covered with great masses of snow and ice, forming a sight which was indescribable.