

of 1½ tons. In addition there are numerous passenger coaches and a large baggage car, 15 feet in length. The railroad is provided with extensive workshops, in which all repairs to locomotives and rolling stock are carried out. At one point there is a remarkable three-quarter circle curve of 40 feet radius, to enable the line to gain a higher level. On festive and other occasions, when the house is full of visitors, special passenger trains are run, comprising eight bogie coaches capable of seating 120 persons.

The private railroad of the Duke of Westminster is of a more ambitious character. It runs through the Eaton Hall estate, and links the residence with the trunk railroad system at Balderton, 3½ miles distant. This line was also designed and constructed by Sir Percival Heywood, and is also of 15-inch gage. The whole system comprises 4½ miles of track, including the direct through line, 3½ miles long, and approximately 1 mile of sidetracks. The track is built upon the latest approved style with Vignole rails, averaging 12 pounds per yard, laid on longitudinal wooden cross-ties, and cost exclusive of buildings and rolling stock \$6,545 per mile, representing an outlay of over \$29,450 in track alone. The gradients vary from 1 in 100 to a maximum of 1 in 65. This railroad is essentially employed for the transport of freight to and from the house, though members of the family and their guests travel between the main-line station and the mansion, there being for such purpose a number of open vehicles and a bogie parlor car capable of seating 16 persons. There are two engines of special design and of low build. They are made with tubular axles and special joints so arranged that an eight-coupled engine can negotiate a curve of 25 feet radius without necessitating any special modification in the motion. The engines in use are four and six-coupled respectively, the former having cylinders of 5 inches bore with a stroke of 8 inches. The second engine, which is that most generally employed, has an over-all length of 10 feet with a width of 3 feet 10 inches, cylinders of 5½ inches bore and 8 inches stroke, and wheels 16 inches in diameter. The heating surface of boiler is 80 feet, and grate area 3 square feet, the working pressure being 175 pounds, at which 60 indicated horse-power is developed. The weight of the engine is 3¾ tons empty and 4½ tons in working order. Bunker capacity for 112 pounds of coal is provided, together with 77 gallons of water. The coal consumption ranges from 280 to 390 pounds per day, according to the work accomplished. The average speed attained with a normal load of 19 tons approximates 11¼ miles per hour, and the cost of running with freight is about 25 cents per ton mile. The engines were also designed by Sir Percival Heywood, and are fitted with his special correcting motion for the Joy valve gear.

The utility of such a railroad as this in connection with such a country seat, and the heavy work it has to fulfill, may be gathered from the fact that the trains cover a mileage of some 5,000 miles, and transport over 6,000 tons of freight per annum. When the house is full, over 40 tons of coal are consumed for domestic purposes per week, and the train conveys over 2,000 tons of coal from the trunk railroad system to the house in the course of the year. The miniature railroad runs into a sidetrack at the station on the main line, and all freight destined for Eaton Hall is transhipped directly thereto. The staff comprises the locomotive engineer and brakeman for the train service, together with two men for the maintenance of the track. The working expenses average \$3,500 per annum exclusive of wages for staff, of which some \$1,500 represents maintenance charges on track and rolling stock, \$150 for locomotive stores, oil, coal, etc., and the balance interest on capital outlay, allowances for depreciation, etc. From this it will be seen that the cost of operating a railroad such as this upon a private estate averages some \$62 per week.

On the Blakesley Hall railroad, owned by Mr. C. H. Bartholomew, both steam and gasoline motor traction is employed. This railway also links the private house with the trunk system, there being a sidetrack at the latter station for the smaller railroad. The gage is likewise 15 inches, and the line about a mile in length including sidetracks, a circular loop and triangle to avoid turning the locomotive on a turntable. The rolling stock is American throughout, the locomotive being of the standard 4-4-0 class reproduced on a 2-inch scale. The passenger coaches are of the bogie type, each having seating accommodation for 12 persons, and the engine is capable of hauling a train of three coaches, carrying 36 passengers, with ease. The cars were originally four-wheeled vehicles, but the owner rebuilt them, using three of the former bodies to make one coach. This alteration proved very successful, since running was appreciably improved on both curves and straight road. In addition there is also a double bogie truck or trolley for conveying heavy baggage and freight between the station and the house. Unlike the majority of such private railroads, this line is at times opened to the public, and is well patronized on such occasions.

The road, which was built by the owner himself, who is a civil and railroad engineer, is especially well carried out. The rails of flat-bottomed Vignole pattern, weighing 12 pounds per yard, are laid on pressed-steel ties. Care has been exercised to keep the grades as easy as possible, the maximum being about one per cent, which requisition, however, entailed heavy embankment and cutting work. Because a stream winds through the estate, extensive bridging became necessary. The bridges are of the girder type. The line is provided with an elaborate electric signaling equipment together with telephonic communication.

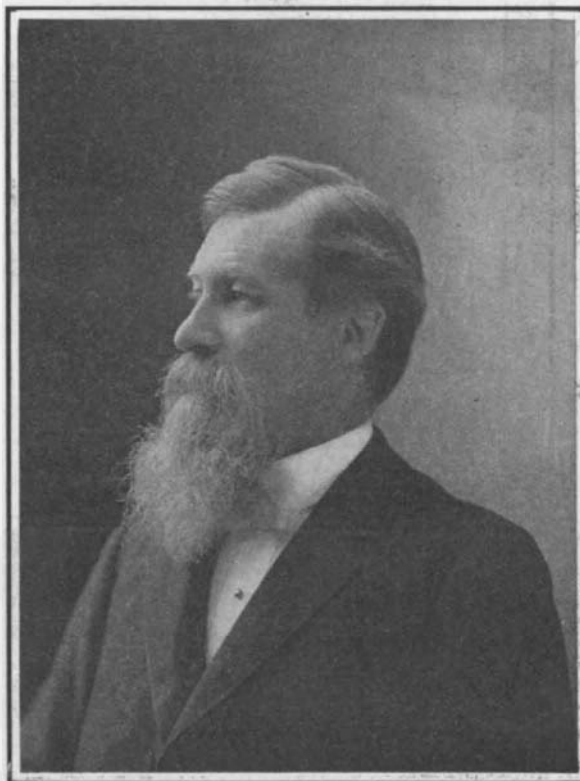
THOMAS CHROWDER CHAMBERLIN.

BY MARCUS BENJAMIN, PH.D.

It has been a frequent practice in the American Association for the Advancement of Science to choose for its president a resident of the place at which it was holding its meeting at the time of the election, or of the place at which it was next to meet. The former course was followed at the gathering held in Chicago last winter; for at that time Prof. Thomas C. Chamberlin, who is one of the foremost leaders in geology, was elected to preside over the meeting to be held in Baltimore this week.

Thomas Chrowder Chamberlin was born in Mattoon, Ill., on September 25, 1843, and was educated at Beloit College, where he received his bachelor's degree in 1866, and also that of master two years later. During the year 1868-9 he pursued a post-graduate course at the University of Michigan, devoting himself chiefly to studies in science.

He began his life-work as a teacher immediately on



THOMAS CHROWDER CHAMBERLIN.

President of the American Association for the Advancement of Science.

graduation, for in 1866 he became principal of the High School in Delavan, Wis. In the autumn of 1869, after finishing his studies at Ann Arbor, he was called to the chair of natural science in the State Normal School in Whitewater, Wis., and remained there for four years. His *alma mater* recognizing his promise in geology, and familiar with his success as a teacher, sought his services, and for nine years, from 1873 to 1882, he was professor of geology in Beloit, which chair he relinquished in order to give more exclusive attention to field work in geology. His success as an administrator was so conspicuous, that in 1887 the growing University of Wisconsin called him to its presidency, and in that capacity he continued until 1892, when on the organization of the University of Chicago he was made head of the Department of Geology and director of the Walker Museum, which places he still holds.

His active work in geology has been most conspicuous. In 1873, the year he went to Beloit, he was appointed Assistant State Geologist of Wisconsin, and three years later he became Chief Geologist of the State, having among his associates Roland D. Irving, Charles R. Van Hise, Rollin D. Salisbury, and others who have achieved distinction in their specialties. Prof. Chamberlin devoted his own attention chiefly to studies on glaciers and glacial formations, on which subjects he is now recognized as the first authority in this country. His eminence in this field led to his appointment in 1882 as geologist in charge of the Pleistocene Division of the U. S. Geological Survey, which he has since retained. He has continued his interest in the Wisconsin Geological and Natural History Survey, of which since 1903 he has been a con-

sulting geologist. In 1904 he served as geologist on the Peary expedition, and also in that year he was made a Commissioner of the Geological Survey of Illinois.

His major publications are more than a hundred in number, and embrace important contributions on the subject of education, as well as annual reports on the geology of Wisconsin and papers on topics pertaining to the glacial period in this country and abroad, and latterly he has written with the accumulated knowledge of years and experience, on fundamental problems of geology, especially on the history of the atmosphere, the planetesimal hypothesis, and the early history of the earth. In book form he is the author of "Geology of Wisconsin" (vol. I, Madison, 1883) and with Rollin D. Salisbury of a "Treatise on Geology" (3 vols., New York, 1904-1906). The Journal of Geology was founded by him and his associates in Chicago in 1892, and he has been its chief editor since that time.

The universities of Michigan and Wisconsin have conferred on him the degree of Ph.D.; the University of Illinois has given him its Sc.D., and Michigan, George Washington, Beloit, and Wisconsin have honored him with the degree of LL.D. Other activities of worthy mention include his appointment by the State of Wisconsin as its representative to the World's Fair held in Paris in 1878, and at which he received a medal for his geological publications, and also he was given a similar award at a more recent exposition held in Paris. He has served the Carnegie Institution in Washington as one of its research associates since 1902, and is therefore consulted by that institution on all awards made in geology.

He was chosen president of the Wisconsin Academy of Science, Arts, and Letters in 1885, and again in 1886, and in 1894 was elected president of the Geological Society of America. Since 1897 he has been president of the Chicago Academy of Sciences. In addition to the foregoing he has been elected to honorary relationships in the Geological Society of Edinburgh, American Academy of Arts and Sciences, Geological Society of Washington, Geological Society of London, and New York Academy of Sciences, and since 1902 he has been a member of the National Academy of Sciences.

Prof. Chamberlin joined the American Association at the meeting held in Dubuque, Iowa, in 1872 and was advanced to the grade of fellow in 1877. He was chosen to preside over the section in Geology and Geography in 1885, and delivered an address at the Buffalo meeting, entitled "An Inventory of Our Glacial Drift." At the meeting held in Chicago in December last Prof. Chamberlin was elected to the highest honor in the gift of the Association, and his name worthily represents American science on that famous roll of honor which began in 1848 with the name of William B. Rogers, likewise a geologist and also distinguished as an educator.

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The Congress of Applied Chemistry.

The Seventh International Congress of Applied Chemistry will be held in London from May 27 to June 2, 1909. The president of honor is Sir Henry Roscoe, the active president Sir William Ramsay, Mr. McNab is general secretary, and Messrs. Thomas Tyrer and C. Whitman are treasurers. Dr. Harvey W. Wiley of Washington, D. C., has been appointed the chairman of the American committee. All who are interested in promoting the applications of chemistry are eligible for membership in the congress. The price of membership is one pound for men and fifteen shillings for women. American chemists intending to become members should send their check for \$5 either to the chairman of one of the sections or direct to the chairman of the American committee at Washington, who will transmit the same to the proper official in London. Those intending to present papers should write to the chairman of the section to which the paper belongs. Papers should be neatly typewritten on thin paper, and be in the hands of the chairman of the American committee not later than April 1, 1909, in order to be forwarded to London for translating and printing.