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1831-1912.

BY

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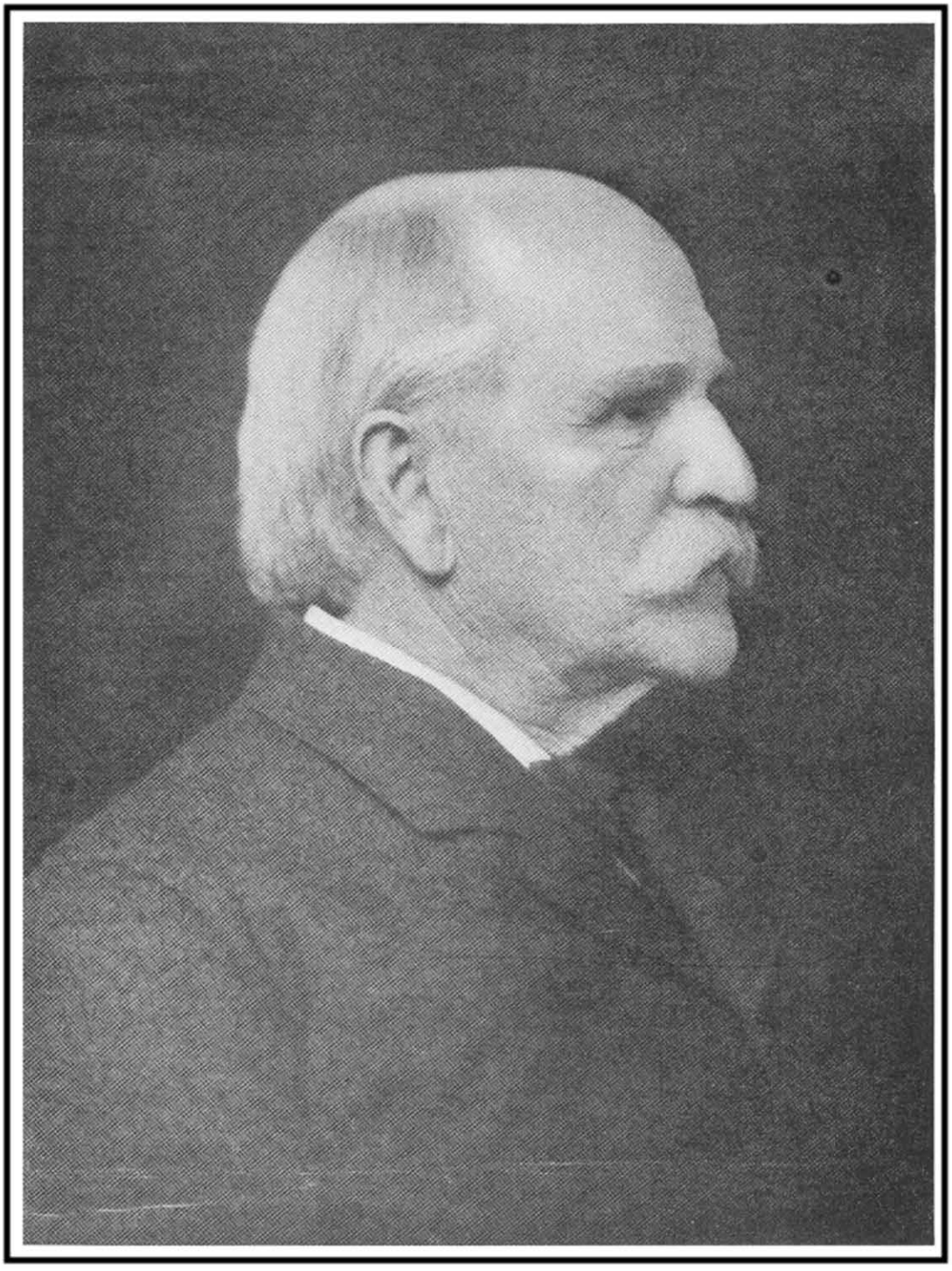

Geo. F. Bush

GEORGE JARVIS BRUSH.

1831–1912.

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Prof. Brush, whose long life of active service for science and Yale University closed on February 6, 1912, will always be remembered as a pioneer in the building up of scientific education in this country. His energy, his indomitable will, his courage in contending with obstacles, and his rare administrative ability were devoted for nearly 40 years with intense singleheartedness to the School of Science from which he obtained his degree in 1852. As the reward of his devotion and that of his colleagues, he had the satisfaction of seeing the school expand steadily from the smallest of beginnings until it was established as a vigorous and growing department of Yale University. He began his work when the value of science, and that of the scientific methods of the laboratory, were but meagerly appreciated in the country; when he resigned from active service in 1898, science had won a large place in every institution and schools of science were to be found at many centers of learning.

Prof. Brush was also an able and trained worker in a special field of science, contributing largely to mineralogy through his own original work and acting as an inspiration to his students, who carried on the research in his favorite subject when his energies were diverted into administrative lines.

George Jarvis Brush was born on December 15, 1831. He was the seventh in line of descent from Thomas Brush, who settled in Southold, Long Island, in 1653, and who is believed to have been the first of the name in America. The father of Mr. Brush was Jarvis Brush, and his mother, Sarah Keeler. The family home was in Brooklyn, N. Y., where the father was in active and successful business as a commission and importing merchant. In 1835, when still a young man, he retired from business, satisfied with the competency he had gained, and moved with his family to Danbury, Conn., where he resided for some six years until 1841, when he returned to Brooklyn. The early education of George was received in private schools in these two places. When fifteen years old he was sent to a school at West Cornwall, Conn., kept by Mr. Theodore S. Gold, and it was here that his interest in science was first aroused. Mr. Gold was an admirable teacher for such a student, for he was enthusiastically devoted to mineralogy and other branches of natural history, and had a rare power in arousing the interest of his pupils in these subjects. Although young Brush was with Mr. Gold only six months, the effect upon his subsequent career was profound. The evidence of this was not shown, however, at once, for the traditions of the family led him to look forward to a business life. After leaving the West Cornwall school he took a position with a mercantile house in Maiden Lane, New York City, and remained there about two years; occasional mineral excursions were his only indulgence in science. But fate had a wider career in store for him. In consequence of a serious illness in 1848 he was compelled to give up the confining life of business, and it was decided that he should devote himself to farming. This decision led him to come to New Haven in October, 1848, to attend the lectures of Profs. John P. Norton and Benjamin Silliman, jr., in agricultural and practical chemistry, recently established in connection with Yale College. The college catalogue for 1848 includes his name as a member of the second class in the "School of Applied Chemistry." His work in New Haven was, however, interrupted when in October, 1850, he went to Louisville, Ky., as assistant to Prof. Benjamin Silliman, jr., instructor of chemistry and toxicology in the medical department of Louisville University,

a position which he retained till the spring of 1852. During this period, in the spring and summer of 1851, he traveled extensively in Europe as one of the party of the elder Proj. Benjamin Silliman. At the Yale commencement of 1852, after a special examination made necessary by the absence alluded to, he received the new degree of Ph. B. just established. It is most interesting that the man who was destined to build up this department of the institution into the strong and flourishing Sheffield Scientific School should have been a member of the first class to receive a degree. In this class of 1852, which began with 14 members, 7 were graduated, 4 of whom later became prominent in science, and one of these, Prof. William H. Brewer, worked shoulder to shoulder with Brush in the work for the school for many years.

The college year of 1852–53 was spent as assistant in chemistry at the University of Virginia, and it was here that, associated with Prof. J. Lawrence Smith, a series of studies were prosecuted on the "reexamination of American minerals"; three papers with this title were published in volumes 15 and 16 of the American Journal of Science. This work in mineral chemistry served to show both his ability in research, his grasp of scientific methods, and his interest in the subject. It also made him feel the necessity of further scientific study and training. After spending the summer of 1853 as assistant in charge of the department of mineralogy in the Crystal Palace at the International Exposition in New York, he sailed in the following November to Germany. The years 1853 to 1855 were spent in Germany, at first at Munich with Liebig, von Kobell, and Pettenkofer, and later at the mining school at Freiberg, Saxony. These years were rich in results, not only in the scientific training they gave, but also in the opportunities for close association with his professors and fellow students.

In 1855 Mr. Brush was elected professor of metallurgy at New Haven, in the Yale Scientific School that had been slowly developing ever since its beginning in 1846. To train himself for his future work he spent another year abroad, studying at the Royal School of Mines in London and also visiting the chief mines and smelting works of Great Britain and the continent. In January, 1857, he entered upon the duties of his professorship of metallurgy; later, in 1864, his chair was broadened so as to include mineralogy, and in 1871 it was finally limited to the latter subject, the one in which he was particularly interested. Of his work after the time when he became professor in the Scientific School, one who was later his colleague for many years wrote of him in 1881:[1]

> From this time on the history of Prof. Brush has been the history of the special scientific department of Yale College, which, in 1860, owing to the liberal benefactions of Mr. Joseph E. Sheffield, received the name of the Sheffield Scientific School. He came to it while it was not only without reputation, but without appreciation or expectation. He came to it while it was poor beyond even that decent poverty which apparently belongs, in the nature of things, to institutions of learning—while it was in a state of mind so unorganized that as a whole it could hardly be said to have a being at all. It exhibited, indeed, a good deal of life in the college catalogue, but beyond that its vitality did not extend. There was vigor enough in certain of its departments, expecially in that of civil engineering, under the charge of Prof. William A. Norton; but in such cases it was a vigor due to the energy of the individual instructor, and therefore almost certain to disappear whenever he disappeared. To bring these scattered units into an organic whole, to build up a complete and consistent scheme of scientific education, which should have both definite and lofty aims, which should train men thoroughly in scientific methods, and which should continue to exist by its own inherent vitality after the men who established it should have passed away—all this became by degrees a main work of Prof. Brush's life. His energy, his judgment, his executive capacity, and his devotion soon gave him the leading direction in the affairs of the institution. He was for a long period its secretary; he has always been its treasurer; and when, in 1872, a more formal organization of its faculty was felt to be desirable, he was elected as its presiding officer, a position which he still retains. Others have done their part toward developing various departments of the school, but its growth, as a whole, the position which it has acquired among scientific institutions, whatever that position may be, has been due to him very much more than to any other one man connected with it. * * *

In 1872, as above stated, Prof. Brush was made director of the Sheffield Scientific School, to which he had already devoted 15 years of his life. This position he held until 1898, when he resigned his active duties, both professorial and administrative. His time and energies of necessity were, from 1872 on, more and more absorbed by the labor of planning for the school as a whole and caring for its many interests. In 1873, Dr. George W. Hawes was

[1] Popular Science Monthly, vol. 20, pp. 119, 120, November, 1881.

appointed assistant in mineralogy, and much of the active work of teaching devolved upon him; thus in the later seventies, Prof. Brush had practically resigned his laboratory instruction and finally, in 1884, he was compelled to give up his lectures also. Dr. Hawes remained in charge of the department until 1879, during which time the classes in laboratory work were transferred to the Peabody Museum after its completion in 1876. In 1879, Dr. Hawes was called to Washington and Dr. S. L. Penfield took his place as instructor in mineralogy; later the latter was made assistant professor (1888), and finally professor of mineralogy (1893); in his able hands Prof. Brush felt that his favorite subject was fully cared for, as was well proved by the work that was published from the Sheffield laboratory of mineralogy. It may well be imagined with what deep sorrow the elder professor saw each of his assistants and helpers cut down in their prime—Hawes in 1882, and Penfield in 1906.

In 1898, as has been stated, Brush resigned his active responsibilities as professor and director. The remaining years of his life were for the most part spent in New Haven, in close touch with the same interests to which he had devoted his life. He continued as secretary and treasurer of the Sheffield trustees until 1900, when he retired as secretary and was elected president of the board. He gave up the treasurership in 1904, but retained the presidency until the end, presiding at the annual meeting in November, 1911.

During the period that has been alluded to, Brush took the liveliest interest in all that pertained to mineralogy, the instruction, the active research, and the increase of his private collection, although he himself, as he sometimes a little pathetically expressed it, was "doomed to turn the crank of the machine." The various duties of the director of the rapidly growing school, financial and administrative, were, however, fully to his taste, and it can hardly be regretted that his time and strength were given so fully to them. His health, on the whole, was not seriously impaired as years increased, until the spring of 1911, when a trouble with the heart developed which from that time increasingly limited his physical activity. The decline was slow and for the most part, until near the end, without suffering, and on February 6, 1912, he passed gently away. The great kindliness of his strong nature was never shown more clearly than in the closing months of his life. In 1864 he was married to Harriet Silliman Trumbull, who died in 1910; three daughters survive him.

The interest taken in minerals by Mr. Brush, when a boy of 15, was rapidly developed during his student years under the stimulating influences at Munich and Freiberg. This interest continued unchanged through his life, though, as has been stated, the pressure of administrative work finally robbed him of the opportunity for active study He developed early a remarkably keen eye for recognizing mineral species, even those which were a puzzle to an ordinary mineralogist. When a schoolboy with Mr. Gold he began to collect minerals, and as years went on and his ability to obtain specimens by purchase or exchange increased, he accumulated a large and very valuable collection. This collection was especially notable for its completeness for the purposes of scientific study and the type specimens which it contained; the history of each specimen was also recorded with the utmost care. His active work as a collector, aided by that of his associates, continued till 1904, when he formally presented his collection, then numbering about 15,000 specimens, to the Sheffield Scientific School, adding to this gift a fund of $10,000 for its maintenance and increase. This collection was housed in the old building of the Sheffield School until its removal to his room in the Peabody Museum in 1876. Here it remained until 1904, when it was placed in a room specially prepared for it in Kirtland Hall, where it is now in charge of Prof. William E. Ford, the successor of Prof. Penfield. He took the greatest satisfaction in having it cared for, arranged, and catalogued; and one of the keenest pleasures of his later years consisted in going over the collection and aiding in the final work upon it.

A mineralogist with so keen an eye and interest in his subject must of necessity have been both a teacher and investigator. In the former direction the influence of Prof. Brush was widely felt, particularly during the decade beginning with 1864. Many students were inspired by his enthusiasm, and carried the knowledge and skill acquired from him to other centers

of learning. The work of Prof. Brush in the original study of minerals began in 1849, when he was only 18 years old. From then for 25 years he was active, and a series of about 30 papers gives a record of the results attained. In 1878, and later, he took time from his absorbing administrative labors, and, in conjunction with a younger colleague, published a series of papers on the newly discovered locality at Branchville, Conn.

In 1874 his "Manual of Determinative Mineralogy" was brought out; this contained a clear summary of blowpipe methods and principles and also a series of determinative tables adapted from the German tables of von Kobell. In the preparation of this work, especially the latter part, Dr. Hawes took a prominent part. A revised edition was issued in 1878, and later the work was entirely rewritten on an expanded scale by Prof. Penfield. The most important editions of the book as thus revised were those of 1896 and 1898. Prof. Brush also made important contributions to the System of Mineralogy of Prof. James D. Dana. Of the ten supplements to the fourth edition of 1854, he prepared the eighth, ninth, and tenth. In the preparation of the fifth edition of 1868 he took an important part; the statements of the blowpipe characters of the different species were written by him, and, in most cases, the facts given were based upon his own independent experiments. His close knowledge of mineralogy also enabled him to aid the author at many points in the prosecution of his task. The first appendix to the fifth edition, issued in 1872, was prepared by Prof. Brush. Another contribution to the science to which he was devoted was the presidential address before the American Association for the Advancement of Science at Montreal in 1882; this was a thorough and valuable summary of the early history of American mineralogy. Prof. Brush became an associate editor of the American Journal of Science in 1863 and retained that position until 1879. The pages of the journal contain about all of his papers on mineralogical subjects.

It has been shown that the influence of his early life tended to turn Mr. Brush into an active business career. Fortunately for the world this was not to be his life's work, but to one familiar with him and what he accomplished, the influence of this early training is clearly shown. He was distinctly a man of affairs, of quick, sure judgment, firmness of resolution, and great energy. The successive steps by which the Sheffield Scientific School grew under his guidance, from 1857 on, show at every stage his ability and his strong hand. Without discussing this subject in detail, it may be stated that the success of this, the most important work of his life, can hardly be overestimated. The school at the beginning had almost no funds, but it early attracted the interest of Mr. Joseph E. Sheffield, and this interest was wisely and tactfully guided and stimulated by Mr. Brush. As the result of this, the school received from Mr. Sheffield a considerable endowment and, in 1861, was formally called the Sheffield Scientific School. The endowment was still further increased later, especially by the provisions of the will of Mr. Sheffield, who died in 1882. It would be difficult, without detailed historical discussion, to give any adequate idea of the complexity and difficulty of the problems of the growing school and of the skill and wisdom with which they were met and solved by Mr. Brush. One particular matter may be mentioned here. The school, in 1863, became the land grant college of Connecticut under the land grant act of the Federal Government. The sale of the land yielded an income which was most important to the school at a critical time in its growth. Later, in 1892, this fund was transferred by the State to the Storrs Agricultural College, but in the contest over the subject the interests of the school were so ably handled by Mr. Brush that in the settlement it received outright a sum of $150,000, thus putting it in a better position than that which it had before occupied.

The financial skill shown in the management of the interests of the school was also used for the benefit of the funds of the Peabody Museum, of which Mr. Brush was one of the original trustees appointed in the deed of gift of Mr. George Peabody in 1866. It was largely through his able management that the original $150,000 grew so steadily and surely that the $100,000 set apart at the beginning amounted to the $176,000 needed to pay for the building completed 10 years later. Mr. Brush sometimes alluded with satisfaction to the fact that he had the foresight to exchange the 5 per cent Massachusetts State bonds of the original Peabody gift for the "seven-thirties" of the Civil War loan, thus producing a rapid increase in the available funds.

It is also interesting to note that for many years he was a director in the Jackson Iron Co. of the Lake Superior district. He was, further, a director in the New York, New Haven & Hartford Railroad from 1893 until his death, attending all the meetings with great regularity.

Prof. Brush was elected a member of the National Academy of Sciences in 1868 and received the degree of doctor of laws from Harvard University in 1886. He presided as president of the American Association for the Advancement of Science at Cincinnati in 1881, and delivered the presidential address at Montreal the following year. He was an honorary member of the Mineralogical Society of England, a foreign member of the Geological Society of London, of the Geological Society of Edinburgh, of the Royal Bavarian Academy of Sciences of Munich, and various other learned societies, both at home and abroad.

The portrait accompanying this sketch has been reproduced from a photograph taken about 1897.

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