



Prof. Joseph Henry.

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MEMORIAL

OF

JOSEPH HENRY.



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REMINISCENCES :*

BY

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THE death of Professor HENRY may be justly termed a national loss, for probably no American since the days of Franklin has done so much for the cause of physical science as the late Secretary of the Smithsonian Institution and former Professor of Natural Philosophy in the College of New Jersey. His eminent attainments and great reputation reflected honor upon the institution with which he was connected from 1832 to 1848, and no graduate of Nassau Hall in that period went forth from its walls without a profound sense of the great benefit derived from the instructions of the professor, and warm attachment to the man.

The writer happened to be a member of the Senior Class at Princeton when Professor Henry was elected Secretary of the Smithsonian Institution, and for a short time held closer relations to him than students are wont to enjoy with a professor. When beginning his lectures to a new class, the Professor was accustomed to select some member of the preceding to assist him, and the writer had the good fortune to occupy this position during a portion of his "senior vacation," as the interval between the final examination and the commencement was styled. Hence these reminiscences, which were given in the College Chapel May 19th and June 2d, and which in response to requests from various quarters are now given to the public.

When Professor Henry was elected Secretary of the Smithsonian Institution, numerous biographies of him appeared in the public journals. While these were correct in the main facts, yet, as was to have been expected, they contained many errors. To correct these, and for the sake of truth, the Professor, overcoming his own

*"Reminiscences of JOSEPH HENRY, LL. D."—Presented in the College Chapel, at Princeton, on the afternoons of May 19th and June 2d, 1878.

modesty, upon one occasion gave the Senior Class a sketch of his life instead of the usual lecture. His lectures always received the most profound attention, and nothing that he said was unheeded; but upon that day his audience hung upon his lips and drank in every word that he uttered. In the simplest words he told the story of his life. Born in Albany, N. Y., December 17, 1799, he received a plain education and was destined to a mechanical pursuit, but, as he expressed it, "he was considered too dull to learn the trade." He read much, however, obtaining the books from a library which was kept in a room adjoining a church. The room had been closed for some years, but he and some of his companions gained access to the books in some way, and he thus enjoyed these hidden treasures. He subsequently attended the Albany Academy, then under the care of Dr. T. Romeyn Beck. After completing his studies he taught a district school, and was private tutor for a time in the family of Mr. S. Van Rensselaer, the patroon. He then devoted a year to the practice of civil engineering, and subsequently became Professor of Mathematics in the Academy, although at an earlier period he said he was "unable to learn geometry."

His attention was first turned to science in a singular manner. He had sustained an injury to his face and was compelled to remain at home for some days. At this time he happened to pick up a small book upon science intended for popular use. This was *Lectures on Experimental Philosophy, Astronomy and Chemistry; intended chiefly for the use of students and young persons*, by G. Gregory, D. D. The following sentences especially attracted his attention:

"Again: You throw a stone, or shoot an arrow upward into the air; why does it not go forward in the line or direction that you give it? Why does it stop at a certain distance, and then return to you? What force is it that pulls it down to the earth again, instead of its going onwards? On the contrary, Why does flame or smoke always mount upwards, though no force is used to send them in that direction? And why should not the flame of a candle drop toward the floor, when you reverse it or hold it downwards, instead of turning up and ascending into the air?"

Young Henry could not answer these questions, but proceeded to read the answer and the full explanation. He perused the volume with ever increasing interest. He asked some of his friends these and other questions, and found that they were no better acquainted with science than himself. He now determined to investigate the subject that had thus presented itself. This little book and these simple questions incited him to enter upon that scientific career and those investigations which have rendered his name immortal. A copy of this little book he was wont ever after to keep beside him. It bore the following lines from his own pen :

“This book, although by no means a profound work, has, under Providence, exerted a remarkable influence upon my life. It accidentally fell into my hands when I was about sixteen years old, and was the first book I ever read with attention. It opened to me a new world of thought and enjoyment; invested things, before almost unnoticed, with the highest interest; fixed my mind on the study of nature, and caused me to resolve at the time of reading it that I would immediately commence to devote my life to the acquisition of knowledge. J. H.”

Professor Henry's subsequent career as a teacher in Albany, Professor of Natural Philosophy in the College of New Jersey, Secretary of the Smithsonian Institution, President of the United States Light-house Board, and President of the National Academy; his discoveries in electricity, magnetism, and electro-magnetism; his interesting experiments in optics and acoustics;—are well known, not only to the scientific world, but to the general public. It is proper to state here that the venerable Dr. John Maclean, who was connected with the Faculty for fifty years, and was for fourteen years the President of the College of New Jersey, suggested and secured the appointment of Joseph Henry as a professor in this college in 1832. The friendship of these two men continued unbroken for nearly half a century. They are separated now, but it can be for only a short time. Dr. Maclean, in his *History of the College*, vol. ii, pp. 288–291, gives a most interesting account of the circumstances attending his appointment. Although known to scientific men, the public had heard so little of him that a trustee

of the college inquired, "Who is Henry?" Even at that time Professor Silliman wrote: "Henry has no superior among the scientific men of the country—at least among the young men;" and Professor Renwick wrote, "he has no equal."

Professor Henry's great modesty prevented him from asserting his own scientific claims; and it was only in connection with suits pertaining to the electric telegraph that his own statements and the testimony of others, judicially presented, irrefragably established his just merits before the general public. From Henry's article in Silliman's *Journal* in 1831, and from personal intercourse with him in Princeton at a later period, Professor Morse obtained a knowledge of those principles of electro-magnetism which rendered his plan successful. Into this controversy the writer does not propose to enter. It is well known, however, that after eminent scientific men had pronounced an electric telegraph impossible, a vision of Utopia, Henry, by his discoveries in Albany and at Princeton, had accomplished the great result, and furnished ocular and *audible* demonstration of the fact. And it is not a little remarkable that the operator now writes his message from the *sound* of his instrument, upon Henry's original principle. He was never tempted to disparage others in consequence of any attempt to detract from his own merits. He once remarked that he "wished to be judged simply by what he had done; it was no great compliment to be told that he had done a great deal considering his few early advantages; but if he was to be remembered, he desired to be remembered for the real value of any discoveries he had made."

He was elected Secretary of the Smithsonian Institution without any effort on his part. The scientific men of this country and of Europe besought him to take the place. While others were seeking the appointment, the late Professor A. D. Bache, Superintendent of the Coast Survey, wrote to Europe and obtained the opinions entertained by the most distinguished scientific men abroad in reference to Professor Henry. The letters of Sir David Brewster, Faraday, Arago, and others, with those of Bache, Silliman, Hare, and similarly distinguished men, were laid before the Board of Regents, and Professor Henry was unanimously elected. It was at that time that Sir David Brewster wrote, "The mantle of

Franklin has fallen upon the shoulders of Henry." It was no selfish motive that induced him to accept the appointment, but a sincere devotion to the cause of science. At that time various plans had been proposed for the employment of the Smithsonian fund, which had been lying in the United States Treasury for some years. A National University, a Public Library had been suggested; but Smithson's known devotion to science, and the wise choice of Professor Henry, made in deference to the most enlightened judgment and in view of his merits, determined the character of the Institution to be established. The first fair copy of the plan of the Smithsonian Institution was in the handwriting of the author of these reminiscences. He would give much now to recover that MS. in its plain, boyish chirography. He remembers that it was "*An Institution for the increase and diffusion of knowledge among men.*" "*To increase knowledge, men were to be stimulated to original research; to diffuse knowledge, the results of such research and reports on the progress of the various branches of knowledge were to be published.*" This general idea was then wrought out into details. This plan, in an enlarged form, was presented to the Board of Regents, and adopted December 13, 1847, and has been repeatedly published. In copying the plan a single word happened to be omitted, and the writer well recalls the nervous twitching of the Professor's lips when he discovered the mistake, and his own regret at the occurrence, and his sorrow that anything should mar the face of a MS. that was intended to be submitted either to the Board of Regents or to eminent scientific men at a distance. Professor Henry remarked to the writer that, except scientific terms, he was very reluctant to use any words not found in Johnson's Dictionary, which he kept upon his study table. His style was pure and simple, very terse and forcible; his manner of lecturing easy, graceful, and impressive. No one who was ever under his instruction can ever forget his definition of science, or his manner of enunciating it with his handsome face and magnificent physique. "SCIENCE, gentlemen, is the knowledge of the *laws* of phenomena, whether they relate to *mind* or *matter*." And what better definition can be given? So admirably were the principles of physical science expressed, so clearly were the facts presented, and so success-

fully were the experiments performed, that even the dullest members of the class had knowledge forced into them almost without an effort on their part, and the brightest were aroused to the utmost enthusiasm. The writer remembers the occasion when the Professor first formulated what may certainly be considered a very happy expression. He was accustomed to dictate a syllabus of each lecture to his assistant, who wrote it upon the blackboard for the use of the class. The students were required to "write up" the lectures from this syllabus, and from their notes taken during the delivery of the lectures. But few books in the writer's library are more highly prized than the two volumes containing these lectures, especially when the kind words of the Professor in commendation of them are recalled. But to return to the incident. He was walking to and fro, and had just dictated: "We explain a fact when we refer it to a *law*;" and then it occurred to him to express the corresponding idea in a similar form: "We explain a *law* when we refer it to the *will of God*." He stopped, and exclaiming, "Yes! that is it!" he repeated the expression. In his notion of law he differed very much from the views of many scientific men of the present time. With him the material never obscured the spiritual, sense never gained the victory over faith. While accepting all the facts and established principles of science, his simple trust in Christ remained unshaken, and his confidence in the God who reveals Himself in His Word, as well as in His works, was undiminished. While, like Sir Thomas Brown, he could say, "There are two books from which I collect my divinity; besides that written one of God, another of His servant, Nature—that universal and public manuscript that lies expanded unto the eyes of all," he could also add, that "the person who thought that there could be any real conflict between science and religion, must be very young in science or very ignorant of religion."

Professor Henry was very successful in his experiments, and took the greatest delight in them. His apparatus was always in perfect order, and if failure ever occurred in his experiments it was a matter of surprise, and could not be attributed to any failure on his part. His lecture-room was in the upper story of the Philosophical Hall, which formerly occupied the site of the present library;

and it is a matter of the most profound regret that it was ever demolished. It corresponded in appearance with the building containing the Geological lecture-room and the Philadelphian rooms. The main room was equal in size to the two rooms of the Philadelphian Society, and there was a smaller room in a projection in the rear, which was subdivided into a room of moderate size, and two small ones. The apparatus was placed in glass cases surrounding the main room, the seats occupying the centre. Probably the most interesting things in this room were the little horse-shoe electro-magnet, with which he made some of his most important discoveries—the little machine which he invented, and which was the first machine moved by electro-magnetism,—and the large electro-magnet, which could support 3,300 pounds, and which was for many years the largest in the world. It could be magnetized, demagnetized, and remagnetized so rapidly that a weight of hundreds of pounds could not detach itself from the grasp of the magnet in the interval of reversing the currents. These things are still preserved in the Scientific School, along with the small glass cylinders, covered with sealing-wax, and the electrical machine prepared after the directions of Franklin. As an illustration of character it may be mentioned that in the largest room of the projection hung a tradesman's placard, upon which was depicted a folded whip, with the legend: "A PLACE FOR EVERYTHING, AND EVERYTHING IN ITS PLACE." From his lecture-room to the opposite building, and thence to his house, which was the house now occupied by General Kargé, but then standing on the site of Re-Union Hall, stretched a wire, through which currents of electricity were sent that rang bells and thus conveyed messages. In his house he also had wire connected with the lightning-rod, and needles inserted in the coils of it, that, like Franklin, he might study the effects of electricity while the storms were raging. The little machine mentioned was simply a small beam of iron, surrounded by a conductor of insulated copper wire and supported by a fulcrum, which was caused to oscillate by the influence of two small stationary upright magnets near its ends. A maker of philosophical apparatus once visited Princeton to sell Professor Henry some of his machines. He showed the person this little machine, and was threatened with a suit for "infringement of patent rights!"

In the discovery of the mode of magnetizing soft iron at a distance by means of currents of galvanism, and in his invention of this little machine, was not merely the possibility, but the fact of the electro-magnetic telegraph. Whatever may be the judgment of the general public, men of science and of education will never deny to Joseph Henry his just meed of praise in connection with this subject. It must ever be remembered that he always placed discovery above invention, and thought more highly of the principles of science than of their practical application.

Some of his discoveries came upon him suddenly, although he never pursued any other than the inductive method, questioning facts, and obtaining principles as results. Upon one occasion in Albany, he was seated in the room with his family, and engaged in profound thought. Suddenly he brought his hand down with force upon the table by which he was sitting, and—like Archimedes when he discovered the mode of ascertaining the specific gravity of bodies and cried out *εὕρηκα, εὕρηκα*,—he exclaimed, “I have it,” “I have it.” He had solved the problem on which he had been engaged, and discovered an important principle of science. In 1844 the College Commencement was changed from the Fall to the Summer, and the vacation lasted only two weeks. He spent these two weeks in scientific experiments. And in what do you suppose these experiments consisted? The answer will excite a smile. *In blowing soap-bubbles*. And yet from this childish amusement the philosopher, like the great Newton before him, was deriving important truths in physical science. All his old pupils will recall how careful he was in explaining, and how rigid he was in insisting upon the inductive method of scientific investigation. None of his pupils was ever likely to confound a mere *hypothesis* with a *theory*, as too many scientific men at present are prone to do.

In going to Washington he remarked that he “sacrificed reputation to fame.” He felt that he should become known throughout the country simply as the Director of the Smithsonian Institution and to some extent of the science of the country, but that he should have little time for scientific investigation which would increase his reputation. This remark was, alas! too true. At that time he seemed to be upon the verge of most important discoveries; he had

made many thousands of experiments, especially upon points in electro-magnetism, and his inductions were leading him to most interesting results. But his career was interrupted, and it was sad afterward to hear him say, "Ten, fifteen, or twenty years ago I made various experiments upon these points, but my duties in Washington have prevented me from pursuing my investigations further." And even the record of those experiments perished in the flames when a portion of the Smithsonian building was burned a few years since. Henceforth he incited others to work and guided them in their investigations. He was the representative of American science, and the contributions of the Smithsonian Institution, and his Annual Reports for thirty years, show how faithfully he carried out the purpose of the Institution. Into the management of its funds he carried the same economy and scrupulous delicacy that he exhibited in his private financial transactions. He would not employ for the use of his family funds which legally belonged to him, because he thought that morally they belonged to a single member of it. If any fault could be found with the financial affairs of the Institution over which he presided, it was that the compensation of the men of science who labored for it was entirely inadequate. Occasionally they were not even paid for their time, much less for their labor or with reference to their scientific reputation. He persistently declined to have his own modest salary increased, and even gave the net proceeds of any lectures he delivered to the Institution. A single incident will illustrate his high character and his delicate sense of honor. Shortly after he was elected Secretary of the Smithsonian Institution, Dr. Hare resigned his position as Professor of Chemistry in the Medical Department of the University of Pennsylvania, at that time probably the most desirable scientific chair in this country. Philadelphia was the headquarters of Medical education; this Medical School was the oldest and the largest in the land; the salary from fees amounted to \$5,000 or \$6,000; the duties occupied less than six months annually, leaving *the remainder of the year free for scientific investigation*. Professor Henry was sent for, and was asked if he would accept the appointment. The writer well recalls the day. The Professor, as he was returning from his interview with the Trustees of the University in

Philadelphia, met him in the college campus in Princeton. He had not yet reached his home, and standing with his carpet-bag in his hand, he gave the writer an account of the interview, and the reasons which induced him *to decline* a position so well suited to his tastes, his wishes, his attainments. He said it would not be honorable for him to decline a position which his scientific brethren desired him to occupy, and where he could accomplish much for science if not for himself; but especially because, if he accepted the chair in Philadelphia, to which a larger salary was attached than he should receive in Washington, *it might be supposed that he was influenced by pecuniary reasons*. How different would have been the great philosopher's career had his decision been different!

He did not favor the erection of a large building for the Institution, remarking that he needed only two rooms as an office. When it was determined to erect the fine building which now adorns the public grounds at Washington, he employed only a portion of the *interest* that had accumulated, and built slowly, so that a portion of this was saved and was added to the original fund.

The first paper that was offered him for publication, according to the writer's recollection, was one by Dr. John Locke, upon the Ancient Mounds in Ohio. The writer well remembers the large bundle of MS., a portion of which, at least, was published in the first volume of the Smithsonian Contributions, if the entire paper was not accepted.*

How faithfully the Secretary discharged all his duties is well known. Amid all the corruption of public life at Washington, there was never a spot upon the fair fame of Joseph Henry; not a breath ever tarnished his reputation. In addition to his duties as Secretary of the Smithsonian Institution, as President of the Light-house Board, he annually inspected the light-houses, and devoted a considerable portion of his vacations for sixteen years to experiments on light and sound for the benefit of the General Government. His only compensation was his expenses. In the desk in the small room that had been fitted up for him near the

*[The paper of Dr. LOCKE was incorporated (with due acknowledgement) in the extended Memoir on "The Ancient Monuments of the Mississippi Valley," by Messrs. SQUIER and DAVIS; which work occupied the entire first volume of the Smithsonian Contributions.]

light-house on Staten Island will probably be found the record of his last summer's observations. As a member of the National Academy, he made many scientific investigations for the Government, and thus saved the country large sums of money.

He died, as he lived, a comparatively poor man; and except a policy of life insurance, the only money he ever laid aside was the few hundred dollars he gained in the year when he was a civil engineer engaged in locating a road for the State of New York. This small sum was taken by a wealthy capitalist, and the interest was annually added to the capital. This money has remained untouched for fifty years, and is now in the hands of the son of the friend of his youth, ready to be given to those to whom he has left a nobler legacy than money, even a good name that is better than precious ointment.