

MEMOIR OF JOSEPH HENRY

Published @ 2017 Trieste Publishing Pty Ltd

ISBN 9780649307159

Memoir of Joseph Henry by Simon Newcomb

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Cover @ 2017

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READ BEFORE THE NATIONAL ACADEMY OF SCIENCES.

APRIL 21, 1880.

WASHINGTON, D. C.

JUDD & DETWEILER, PRINTERS

1903

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BIOGRAPHICAL MEMOIR OF JOSEPH HENRY.

In presenting to the Academy the following notice of its late lamented President the writer feels that an apology is due for the imperfect manner in which he has been obliged to perform the duty assigned him. The very richness of the material has been a source of embarrassment. Few have any conception of the breadth of the field occupied by Professor Henry's researches, or of the number of scientific enterprises of which he was either the originator or the effective supporter. What, under the circumstances, could be said within a brief space to show what the world owes to him has already been so well said by others that it would be impracticable to make a really new presentation without writing a volume. The Philosophical Society of this city has issued two notices which together cover almost the whole ground that the writer feels competent to occupy. The one is a personal biography—the affectionate and eloquent tribute of an old and attached friend; the other an exhaustive analysis of his scientific labors by an honored member of the society well known for his philosophic acumen.* The Regents of the Smithsonian Institution made known their indebtedness to his administration in the memorial services held in his honor in the Halls of Congress.

Under these circumstances the only practicable course has seemed to be to give a condensed *résumé* of Professor Henry's life and works, by which any small occasional gaps in previous notices might be filled. That in doing this the writer may repeat much that has already been better said by others is a fault which he hopes the Academy will pardon in view of the difficulty of avoiding it.

The interest which, in the light of modern theories of heredity,

*The scientific work of Joseph Henry: Bulletin of the Philosophical Society of Washington, vol. II, p. 230; Smithsonian Miscellaneous Collections, vol. xxi, pp. 205-425; A Memorial of Joseph Henry, published by order of Congress, 1880.

attaches to the ancestry of men possessing uncommon intellectual powers would naturally lead us to desire a knowledge of Professor Henry's ancestors. We have, however, no sufficient historical data for gratifying any desire of this kind. Little more can be said than that his grand-parents were of Scottish origin, and landed in this country about the beginning of the revolutionary war. Of his father little is known, and that little does not enable us to explain why he had such a son. His mother was a woman of great refinement, intelligence, and strength of character, but of a delicate physical constitution. Like the mothers of many other great men, she was of deeply devotional character. She was a presbyterian of the old-fashioned Scottish stamp, and exacted from her children the strictest performance of religious duties.

The son Joseph was born in Albany, on the 17th of December, either 1797 or 1799.* The doubt respecting the year has not yet been decisively settled. At the age of seven years he left his paternal home and went to live with his grandmother at Galway, where he attended the district school for three years. At the age of ten he was placed in a store kept by a Mr. Broderick, and spent part of the day in business duties and part at school. This position he kept until the age of fifteen. During these early years his intellectual qualities were fully displayed, but in a direction totally different from that which they ultimately took. He was slender in person, not vigorous in health, with almost the delicate complexion and features of a girl. His favorite reading was books of romance. The lounging-place for the young villagers of an evening was around the stove in Mr. Broderick's store. Here young Henry, although the slenderest of the group, was the central figure, retailing to those around him the stories which he had read, or which his imagination suggested. He was of a highly imaginative turn of mind, and seemed to live in the ideal world of the fairies.

At the age of fifteen he returned to Albany, and, urged by his imaginative taste, joined a private dramatic company, of which

*This uncertainty appears to have resulted from the difficulty of deciphering the faded record of date in the old family bible. The writer's personal examination of the extant material leads him to favor the earlier date, which he believes to have been the one to which Henry himself was inclined.

JOSEPH HENRY.

he soon became the leading spirit. There was every prospect of his devoting himself to the stage when, at the age of sixteen, accident turned his mental activities into an entirely different direction. Being detained indoors by a slight indisposition, a friend loaned him a copy of Dr. Gregory's lectures on Experimental Philosophy, Astronomy, and Chemistry. He became intensely interested in the field of thought which this work opened to him. Here in the domain of nature were subjects of investigation far more worthy of attention than anything in the ideal world in which his imagination had hitherto roamed. He determined to make the knowledge of this newly opened domain the great object of his life, but did not confine himself to any narrow sphere. He devoted himself immediately, with great ardor, to study. During the three years following he was successively English teacher, pupil of various masters, and a student at the Albany Academy. At about eighteen years of age he was recommended by Dr. Beck to the position of private tutor in the family of the patroon. He found this situation to be a very pleasant one, and was treated with great consideration by the family of Mr. Van Rensselaer. His duties required only his morning hours, so that he could devote his entire afternoons to mathematical and physical studies. In the former he went so far as to read the *Mécanique Analytique* of La Grange.

His delicate constitution now suffered so much from confinement and study that he accepted an invitation to go on a surveying expedition to the western part of the State. In this work his constitution was completely restored, and he returned home with a health and vigor which never failed him during the remainder of his long and arduous life. Soon after his return he was elected a professor at the Albany Academy. Here a new field was opened to him. It is one of the most curious features in the intellectual history of our country that, after producing such a man as Franklin, it found no successor to him in the field of science for half a century after his scientific work was done. There had been without doubt plenty of professors of eminent attainments who amused themselves and instructed their pupils and the public by physical experiments. But in the department of electricity, that in which Franklin took so prominent a position, it may be doubted whether they enunciated a single generalization which will enter into the history

of the science. This interregnum closes with the researches now commenced by Professor Henry. His first published paper on the subject was read in 1827 before the Albany Institute, and is entitled, "On some modifications of the electro-magnetic apparatus." It consisted simply of a brief discussion of several forms of apparatus designed to exhibit the mutual action of the galvanic current and the magnet, but does not appear to comprise any discussions of new ideas. Two years later he published a topographical sketch of the State of New York, which also appeared in the Transactions of the Albany Institute. It comprises a brief sketch of the physical geography of the State with especial reference to the newly inaugurated canal system.

In 1831 he published in Silliman's Journal a paper on the development of great magnetic power in soft iron with a small galvanic element. This paper is in some sort a continuation of his first paper; the fundamental object of both being to show how the greatest development of magnetism could be obtained with the smallest battery. The ideas were suggested by the study of Schweigger's Galvanometer. He shows that in a piece of soft iron the magnetic power produced by the galvanic current may be greatly increased by increasing the number of coils. A still further improvement is made when, instead of passing a single coil between the two poles of the battery, a number of separate insulated wires are wound around the magnet, so that each shall form an independent connection. He was thus enabled with a battery of a single pair of small plates (4 by 6 inches) to form an electro-magnet which would lift a weight of 39 pounds. He also intimates that by winding a separate wire on each inch of the magnet a yet greater effect could be attained. This paper also contains the germ of the theory of electro-magnetic force, and of electrical resistance and quantity, though not developed in any generalized form. He explains that with one very long wire a combination of several plates must be used so as to obtain "projectile force," while when several larger wires are used the battery must consist of a single pair. A great number of experiments illustrative of the theory are described. With a battery having a single plate of zinc, of half a square foot of surface, he made a magnet lift a weight of 750 pounds,—more than thirty-five times its own weight.

In the same year, 1831, he describes a little machine for pro-