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BIOGRAPHICAL MEMOIR

OF

JOSEPH LOVERING

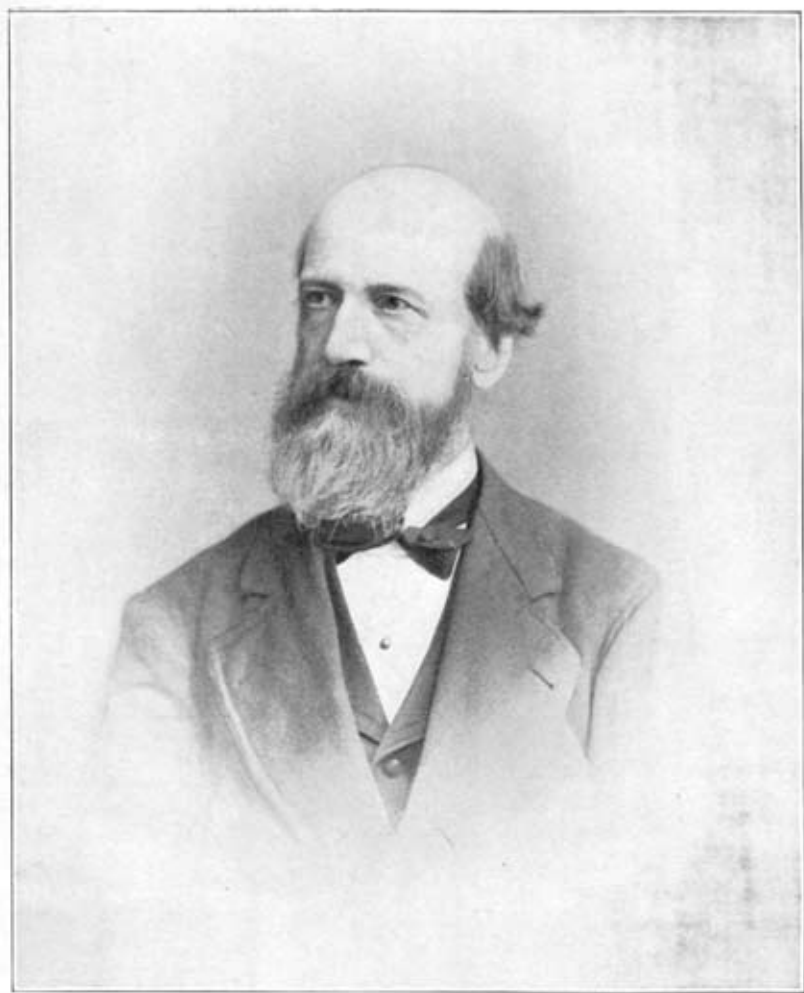
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Joseph Lovering.

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Of the biographical memoirs which are to be included in Volume VI, the following have already been issued:

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BIOGRAPHICAL MEMOIR OF JOSEPH LOVERING.*

PROF. JOSEPH LOVERING was born at Charlestown, Massachusetts, December 25, 1813, and received his early education in the public schools of that place. His father, a subordinate town officer, was a member of the Unitarian church then under the pastoral care of the Rev. James Walker, who afterward became a professor in Harvard College, and eventually the President of Harvard University. At school young Lovering proved himself an apt and diligent scholar, and this brought him under the notice of Dr. Walker, who employed him as reader, and soon saw in the lad such unusual promise that he urged him to fit himself to enter college, and not only aided the boy with personal instruction, but advanced the money necessary to pay his college expenses. In 1830 Lovering entered the sophomore class at Harvard, and was graduated in 1833. In his academic course he soon distinguished himself. Prof. Andrew Preston Peabody, who was his instructor in astronomy, said that Lovering was one of the three or four students on whom he relied to do credit to the class in the public oral examination held at the end of the term. With a few of his fellows, Lovering studied Hebrew also with Dr. Peabody, and made a deep impression on his teacher, who afterward spoke with admiration of his diligence, promptness, and accuracy. Lovering stood fourth in a class which furnished six professors to Harvard and four to other institutions. At commencement he delivered the Latin salutatory oration, and three years later, when, according to the fashion of the time, the members of his class were entitled to receive the Master's degree, he gave the valedictory oration.

During the first year after graduation he taught a small private school in Charlestown, but in the autumn of 1834 he entered the Divinity School at Cambridge, with the intention of preparing himself for the ministry. He remained in the school

*Compiled from the addresses made by Prof. J. P. Cooke, President Eliot, Rev. Dr. A. P. Peabody, and others at the meeting of the American Academy of Arts and Sciences, Boston, held in commemoration of the life and services of Professor Lovering.

for two years. During a part of 1834-5 he assisted Prof. Benjamin Peirce in the instruction of the college classes in mathematics, and in 1835-6 added to this work the duties of proctor, and much of the time conducted both the morning and the evening services in the College Chapel, in place of the regularly appointed clergyman. In 1836 Lovering seems to have given up definitely his purpose of becoming a preacher, and in the autumn of that year he became tutor in mathematics and lecturer in natural philosophy in Harvard College, taking the work of Prof. John Farrar, whose failing health had led him to resign. In 1838 he finally succeeded Professor Farrar as Hollis Professor of Mathematics and Natural Philosophy.

The active duties of this office Professor Lovering discharged without assistance for the unprecedented term of fifty years, and on resigning in 1888 he was appointed by the Corporation of the University "Hollis Professor Emeritus," so that he continued his connection with Harvard College until his death, in 1892, put an end to a service of fifty-eight years.

Professor Farrar had a very high reputation for eloquence, and it must have been a severe ordeal to the young man to attempt to fill the place of such a brilliant lecturer as Farrar had been. The event showed, however, that, although he did his work in a very different way, Lovering's instruction was no less effective than that of his celebrated and popular predecessor. From the very first his success was unmistakable, and, in the estimation of the New England college world, he soon came to hold a prominent place in the rank of lecturers on physics and astronomy.

At the beginning of Lovering's career as professor the Lyceum was still an educational institution, and much of his reputation was won on the public platform. At different times, beginning in 1840, he delivered nine courses of twelve lectures each before the Lowell Institute, and these were extremely popular. He had great clearness of thought and singular definiteness and felicity of expression. He was apt in illustration, and a quiet humor often enlivened what would have been otherwise a dry demonstration. He gave most careful attention to the mechanical preparation of his lectures, and his experiments rarely failed of success. Besides his regular college lectures, during term time

always one and usually two a week for a long period of years, and the lectures at the Lowell Institute above referred to, Professor Lovering gave shorter courses at the Smithsonian Institution in Washington, the Peabody Institute of Baltimore, and the Charitable Mechanics' Institution of Boston, and one or more lectures in many towns and cities of New England.

Prof. Josiah Parsons Cooke, who was himself one of the very best popular lecturers on science of the last generation, said after Professor Lovering's death:

"He was one of the best lecturers I have ever known, and I have known the greatest masters of my time. He may not have had the imagination of Faraday or the grace of Dumas, but his lectures were instructive in the highest degree. The chief sources of his power are not far to seek. In the first place, he had the great art of bringing his reasoning and his illustrations to the intellectual level of his hearers, without belittling his subject. He was a popular lecturer in the very best sense. He did not commit the common error of seeking to gain attention through trivialities, or of attempting to appear learned by using technical terms; but he sought to raise his audience from their lower plane to his level, and he succeeded to a wonderful extent. Again, he had remarkable clearness of statement, and he gained this in the only way it can be gained, by seeking definiteness of conception. He did not trust to the inspiration of the moment to make a difficulty, however familiar to him, intelligible to others; but he laboriously studied every subject he taught until he had a firm grasp of all the concepts, and then the stream was clear because the spring was clear. Lastly, Mr. Lovering had, to a greater degree than I have ever known, the power of looking at physical problems from different sides, and seeing them in all their aspects. This gave him great fertility in illustration, and often enabled him to present a subject from a point of view wholly unexpected even by adepts in the science.

"The wonderful clearness and elegance of exposition so conspicuous in Professor Lovering's lectures appeared also in his monographs and popular essays on scientific subjects. These are very numerous, and are models of scientific style.

"Besides their intrinsic value as the literary work of a very successful teacher, they are valuable material for the history of science. Professor Lovering's long career covers a period of wonderful development in all departments of physics, not simply in the discovery of new facts, but also in the change of aspect under which the old facts are regarded. He was a broad scholar, not only familiar with the past history of every branch of his subject, but also accustomed to look at facts from all sides."

As might have been expected from the character and the direction of his scientific work, Professor Lovering had marked executive ability, and, during the long period when he was Regent of Harvard College, then the second executive officer, he was in the highest degree methodical, accurate, and just. When the Jefferson Physical Laboratory was opened in 1884, Professor Lovering carried to it the very large and valuable collection of lecture apparatus which he had gradually accumulated during his long period of service as Hollis Professor. He took great pleasure and a just pride in this. When he entered upon his office there was already in the possession of his department a considerable number of philosophical instruments, some of which had a real historical interest, but they did not meet the requirements of a more modern science. Only a small annual appropriation could be obtained for the expenses of his lectures; but by carefully husbanding the resources, and doing all the mechanical work with his own hands, he was able from time to time not only to purchase the indispensable articles, but also to procure many novelties as they appeared. He judiciously used his large knowledge and judgment in the original selection, and by constant watchfulness prevented the apparatus from deteriorating, and thus during his long term of service he brought together one of the most complete cabinets of physical apparatus in this country. Nothing delighted him more than some new mode of illustrating a recondite principle in a striking way, and every year, at the meeting of the old Scientific Club of Cambridge, he would delight his associates also by bringing forward and explaining some such piece of apparatus, and he rose to the highest point of enthusiasm when he made it to appear that the paradoxes of science were no paradoxes at all, but the necessary unfoldings of fundamental laws.

In speaking of Professor Lovering's services to Harvard College, President Eliot once said:

“Professor Lovering's life seems to me to be better characterized by the word fidelity than by any other. He was just as faithful in the least things as in the greatest. Whatever work he undertook, he did thoroughly and steadily, although it might be uninteresting, mechanical, or really unsuitable for one of his station and powers.

“For twelve years, from 1857 to 1869, he was Regent of the college. That officer kept the records of absences and of the marks received by the students at their recitations. With his own hand Professor Lovering entered the absences and the marks in the record books, kept watch on the absences of every student in college, considered excuses, and reported delinquents to the faculty week by week. The Regent exercised discretion, and needed good judgment; but far the greater part of his time was devoted to accurate, patient clerical work. He was in his office three days of the week for two hours each day, and his compensation was five hundred dollars a year. I mention these details because they perfectly illustrate a quality in Professor Lovering which the men of a younger generation may well imitate—a capacity for assiduous routine labor. Every great scholarly achievement is accomplished by just such faithful industry. An inspiration is a momentary flash; a high purpose has an instant of formation; but inspiration and purpose have to be wrought out through years of unremitting labor.

“I have always admired in Professor Lovering the mixture of conservatism with openness of mind. His natural conservatism was modified by a true scientific candor. Change for its own sake he never desired; but he could be convinced by experience that a given change was an improvement. He held to the opinions and practices which he had adopted before he was forty years old; but his mind was also open to new projects. When the rapid expansion of Harvard University began in 1866, just after the close of the Civil War, Professor Lovering was already fifty-three years old and had been thirty years in the college service. When I was elected President he was fifty-six—a time of life at which many men become impatient of changes which seriously affect their own habits of work. Yet Professor Lovering welcomed the project of moving the entire physical establishment from its narrow quarters in University Hall to larger rooms in Harvard Hall. He personally arranged the lower floor of Harvard Hall to receive the Department of Physics and was highly content with the new accommodations of the department when the transfer was completed in 1870. But the department grew apace and the great gift of Mr. T. Jefferson Coolidge for the construction of a new physical laboratory made it possible to provide the department with larger quarters still and opened the way to a great increase both of the teaching and of the investigation which it carried on. At the age of seventy-one Professor Lovering entered heartily into this large undertaking, brought to it a flexible and fertile mind, moved again from Harvard Hall to the Jefferson Physical Laboratory, and was glad to be appointed the first director of that ample establishment.”

Besides his uninterrupted work for the college, Professor Lovering discharged other executive duties in which he exhibited his usual faithfulness and good judgment. From 1854 to 1873 he was the Permanent Secretary of the American Association for the Advancement of Science—an office which requires an unusual amount of executive skill, besides tact and affability. On the Permanent Secretary devolve the arrangements for the annual meeting, the collection and disbursement of the funds, and the publication of the yearly volume of Proceedings. It is all important that he should commend the Association to the successive communities where it meets, and commend himself to the local committees. All this service Professor Lovering rendered with great success, and carried the society through the disintegrating period of the Civil War, when its continued life seemed impossible, and so skillfully managed its finances as not only to print a volume of Proceedings every year, but also to leave in the treasury at the end of his term of office a valuable stock of publications and a goodly cash balance. On resigning this office, Mr. Lovering was elected President of the Association, and served as such at the Portland meeting of 1873. Both his reception and his retiring addresses were admirable in thought as well as in spirit, and are excellent examples of the best use of idealism in science.

In the first of these he said: "It is impossible for the man of science to serve two masters, the Kingdom of Nature and Mammon. It is a dangerous thing for him to be thinking of the utility of his discoveries, or of the pecuniary profit which may be made out of them." And in the second he adds: "Science is not destructive, but progressive; while its theories change, the facts remain. Its generalizations are widening and deepening from age to age. We may extend to all the theories of physical science the remark of Grote which Challis quotes in favor of his own: 'Its fruitfulness is its correctibility.' Instead of being disheartened by difficulties, the true man of science will congratulate himself, in the words of Vauvenargues, that he lives in a world fertile in obstacles. Immortality would be no boon if there were not something left to discover, as well as to love."

Professor Lovering was also for some years one of the trustees of the Tyndall Fund for the endowment of research in physics,

and during the last few years of his life he was one of the trustees of the Peabody Museum of American Archæology and Ethnology.

He was elected a fellow of the American Academy of Arts and Sciences at Boston in 1839, and he served this society in various subordinate positions for thirty-three years, and as President during the last twelve years of his life. He became a member of the National Academy of Sciences in 1873, and was also a member of the American Philosophical Society of Philadelphia, of the California Academy of Sciences, and of the Buffalo Historical Society. In 1879 he received from his Alma Mater the degree of Doctor of Laws.

Professor Lovering was not a writer of books, but he was an editor of very large experience. He was co-editor with Prof. Benjamin Peirce of the "Cambridge Miscellany of Mathematics, Physics, and Astronomy," published at Cambridge in 1842 and 1843, and devoted to pure and applied mathematics. He edited fifteen volumes of the Proceedings of the American Association for the Advancement of Science, also six volumes of the Memoirs and three volumes of the Proceedings of this Academy, and earlier, in 1842, a new edition of Farrar's Electricity and Magnetism. In 1873, as has been said, he was the President for the year of the American Association, and in his reception address at Portland he said: "Few of us can aspire to the honor of being discoverers of the laws of nature in the highest sense of that phrase. But no one, however humble his capacities, or however limited his opportunities, who labors for science, will fail to advance it." This well expresses the attitude of Lovering toward his profession. He was not a born investigator, but one whose path in life was determined by force of circumstances, rather than by natural predilections. He was primarily a scholar, and the great service which he rendered to science was that of a scholar and a teacher, and not that of an experimenter.

But although Professor Lovering seems to have had little inclination to undertake original experimental investigation in physics, he did a very large amount of work in observing and correlating facts. He was associated with the late Prof. William C. Bond in the management of the primitive astronomical observatory first located at Cambridge in the dwelling-house

still remaining on the corner of Quincy and Harvard streets, and there took part in that concerted onset on the problem of the earth's magnetism instituted by Humboldt and Gauss, and continued throughout the British Empire for several years under the direction of the Royal Society of London. An appeal was made to various academies and men of science in this country to co-operate in the work, and the appeal was responded to by the Magnetic Observatory at Philadelphia under the care of the late Professor Baché, and by the American Academy of Arts and Sciences in Boston, which supplied the Cambridge Observatory with the requisite instruments. The plan of the Royal Society involved, besides frequent regular daily observations, an almost continuous watch on the magnetic needle during one day of each month. On these days, called term days, observations were made every five minutes on three different instruments, day and night. The chief burden of all this work fell on Professor Lovering, although he was greatly assisted, not only in the observations themselves, but also in their reduction and in the mathematical discussion of the results, by Professors Bond and Peirce and a few competent undergraduates. Of these last, Thomas Hill, afterward President of Harvard College, and Benjamin A. Gould, the distinguished astronomer, deserve special mention.

Professor Lovering's experience in this famous magnetic campaign must have familiarized him with the magnetic disturbances accompanying the auroral discharge, and thus led him to discuss the mooted question of the periodicity of the aurora. His study of this problem was the most considerable work of his life. It involved the collating and discussing of an immense number of more or less indefinite observations, and the mere presentation of the result of his laborious investigation occupies 350 quarto pages in the *Memoirs of the American Academy of Arts and Sciences*, new series, vol. x. part i. Professor Lovering clearly defined the secular periods of the aurora, and also showed that no apparent connection could be traced between the secular periodicity of the aurora and the secular changes of the earth's magnetism, the periods of sun-spots, fire-balls, or earthquakes, or any other secular changes with which the aurora had been associated by various physicists. As he writes in this memoir, "A lesson of caution against hasty conclusions on sub-

jects of such complexity may be drawn from the fact that whereas Boné favored the conclusion that the aurora goes hand in hand with the earthquake, and whereas Wolf had decided, though from data afterward acknowledged to be insufficient, that years rich in sun-spots corresponded to years rich in earthquakes, Kluge, from a more searching examination and the use of larger materials, finds a periodicity for earthquakes as long as that which governs the sun-spots and magnetic disturbances, but with maxima and minima reversed." We quote this as an indication of our colleague's judgment and caution in the discussion of observations, and although the investigation did not lead to the discovery of unsuspected relations, yet the negative results reached were of the greatest importance, and the memoir just referred to may be quoted as an example of great thoroughness in the collection of materials, and of remarkable freedom from bias in the discussion of results.

Between 1867 and 1876 Professor Lovering was connected with the United States Coast Survey, and had charge of the computations for determining differences of longitude in the United States, and across the Atlantic Ocean, by means of the land and cable lines of telegraph. The most important and interesting portion of the work which he did in this connection is discussed in a paper "On the Determination of Transatlantic Longitudes by means of the Telegraphic Cables," published in the *Memoirs of the American Academy of Arts and Sciences*, new series, vol. IX. 1867, Pt. 2, pp. 437-477.

Professor Lovering was pre-eminently a social man, and any notice of him would be incomplete that did not allude to this genial phase of his character. He was one of the few men who could hold his opinions and maintain his position without personal animosity or unfriendly feeling, could favor without partizanship, could oppose without bitterness. He never would quarrel, and, as he once said, it takes two to make a quarrel and the other man only counts one. Besides a frank cordiality and kindness of greeting which made him very accessible, he had a fund of dry humor, which not only enlivened intercourse, but often gave force to an argument. Not unfrequently in meetings of the college faculty he would turn a stupid debate, and exhibit a question in its real absurdity, by a witty remark. There was

also a straightforwardness, integrity, and truthfulness about his intercourse which inspired confidence and warmly attached him to his friends. He was perfectly just and singularly free from bias, and in any question involving rectitude or faithfulness you could always count on him. He was faithful to every duty, and conscientiously discharged every obligation. He rarely, if ever, missed an appointment, and whatever he undertook, however unimportant, he did with all his might.

Besides attending and keeping up the spirit of the Cambridge Scientific Club, of which he was one of the original members, he was uniformly present at the meetings of the Thursday Evening Club in Boston, and often contributed to its Proceedings. He very greatly enjoyed these meetings, and his communications were always esteemed by the members. He had the happy faculty of popularizing a subject without degrading it. He could present a problem so that his audience could follow as far as he led, and understand why he did not attempt to lead them further. His discourse was always free from trivialities or redundances, and his hearers could appreciate the grandeur of the mountain all the better because they had not made a fruitless attempt to climb it.

It was a very fitting tribute to Professor Lovering's warm social nature that at the close of his active duties, in 1888, a banquet should be held in honor of his fifty years' service. It was the spontaneous offering of classmates, associates, pupils, and friends, and it afforded him the highest satisfaction.

Professor Lovering was married in 1844 to Sarah Gray Hawes, of Boston, and at his death his wife, with two sons and two daughters, survived him. After retiring from active work, he passed four serene and happy years. On several occasions he said to a colleague: "You don't know what a pleasure it is to be relieved from stated duties, and to have full command of your time. I have plenty to do, and never have an idle moment." Through great prudence and thrift he had laid aside a sufficient competency to relieve him from all pecuniary anxieties, and his friends had hoped that he might long pass the full term of four-score years. His wonderful vitality and singular immunity from disease encouraged this hope; but it was not to be. A severe cold, followed by influenza, weakened the heart, and the end

came in the early morning of January 18, 1892. He died peacefully and without pain.

The following catalogue of Professor Lovering's publications has been prepared in the office of the Home Secretary of the National Academy of Sciences. It is based on a list of titles given in the College Class-book entitled "Memorials of the Class of 1833 of Harvard College, prepared for the Fiftieth Anniversary of their Graduation by the Class Secretary, Waldo Higginson":

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- 1840-41. Electricity and Magnetism.
- 1841-42. Mechanics.
- 1842-43. Astronomy.
- 1843-44. Optics.
- 1845-46. Astronomy.
- 1853-54. Electricity and Magnetism.
- 1859-60. Astronomy.
- 1865-66. Light and Sound.
- 1879-80. Connection of the Physical Sciences.