

MEMOIR
OF
STEPHEN ALEXANDER.

1806-1883.

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BIOGRAPHICAL MEMOIR OF STEPHEN ALEXANDER.

MR. PRESIDENT AND GENTLEMEN OF THE ACADEMY :

Professor STEPHEN ALEXANDER, one of the original fifty corporate members of the Academy, died at Princeton, New Jersey, on June 25th, 1883, after a lingering illness. He was nearly seventy-seven years of age, having been born September 1, 1806, in Schenectady, New York. His father, Alexander Alexander, was of Scotch extraction, an active and successful business man in Schenectady. He died in 1809, at the early age of forty-four, leaving his widow, with two small children—Stephen, the subject of the present sketch, and a younger sister, Harriet, who afterwards married her cousin, Joseph Henry. The elder Alexander, at the time of his death, possessed property considerable in amount; but it was to some extent in an unavailable form, much of it consisting of wild lands scattered about in the States of New York and Virginia. In the settlement of the estate a good deal of this landed property seems to have been frittered away and lost, but the homestead remained (a fine old stone mansion, built of materials brought from Holland, and still standing in Schenectady) and with it a sufficient amount of other property to put the widow far above want and to enable her to bring up her children in comfort and refinement.

The writer has no account of the childhood and youth of young Alexander. From his subsequent physique and character it is natural to infer that he was a delicate, quiet, sensitive, and studious boy—a mother's boy—rather than a sturdy, boisterous youngster. He must have had good schooling and must have been bright and somewhat precocious, for he completed his academic course before he was eighteen years old, graduating in 1824 at Union College with high honor.

He engaged in teaching immediately after graduation, and for several years was connected with an academy at Chittenango, New York. I have not been able to learn whether he then intended to make teaching his ultimate profession, or whether, like so many others, he only took it up for the purpose of procuring funds to enable him to go on with professional studies in some other direction;

nor do I know whether, before going to Princeton, he had any other engagement than that at Chittenango. I am disposed to think, however, that in 1830 and 1831 he may have been connected with the Albany Academy. At any rate in 1829 his mother moved to Albany, with her family, and letters and papers in the possession of the family show that in 1830 and 1831 he was making numerous astronomical observations in Albany and communicating them to the Albany Institute. It is not unlikely that the fact that Professor Henry had been appointed to a chair in the Albany Academy in 1828, and was then entering upon his distinguished career, may have determined the removal of the Alexander family to Albany. Professor Henry was the son of the elder Alexander's sister, and in 1830 he married his cousin, Miss Alexander, thus establishing a double relationship, which unquestionably shaped the whole life and fortune of his younger and favorite cousin and brother-in-law.

In 1832 Professor Henry accepted a call to the chair of natural philosophy in the College of New Jersey, and removed to Princeton with his family. Young Alexander came with them and entered the Theological Seminary as a student, intending to fit himself for the Presbyterian ministry.

In 1833, however, he was appointed to a tutorship in the college, and began his fifty-three years' service as a member of its faculty.

In 1834 he was made adjunct professor of mathematics, and in 1840 he was promoted to the full professorship of astronomy, which he retained until 1876. During the long intervening period the style and duties of his professorship were several times more or less modified. For several years after the death of Professor Dod he was professor of mathematics and astronomy. When Professor Henry went to Washington he gave up the mathematics and became professor of natural philosophy and astronomy; but he always held fast to the astronomy.

In 1876 he was retired from active service at the age of seventy, and made professor emeritus, with a suitable provision from the funds of the college for his declining years.

The last six years of his life he spent in dignified retirement and quiet, always busy with head and pen, but, on account of his continually growing feebleness, not appearing much in public nor able to complete many things for the press. Some months before his death he met with a singular accident (a fall out of bed) by which he fractured an arm and dislocated the shoulder. The dislocation

was easily reduced, and, rather contrary to expectation, the broken bone reunited kindly. He never recovered his strength, however, but gradually faded away until at last he died apparently from mere exhaustion.

In 1836 he married Miss Meads, of Albany, who died in 1846, leaving three daughters, two of whom are still living, both married. Four years later, in 1850, he married Miss Forman, of Princeton, who survives him, with two unmarried daughters.

In 1839 he was elected a member of the American Philosophical Society of Philadelphia, and in 1850 he became a fellow of the American Academy of Arts and Sciences in Boston.

In 1852 Columbia College conferred upon him the degree of LL. D.

He was early and for many years a prominent member of the American Association for the Advancement of Science, and served as its president at the Springfield meeting of 1859.

In 1862 he was one of the fifty original members named in the bill which brought into existence our National Academy of Sciences.

As has already been incidentally mentioned he began astronomical work in 1830. In that year he observed a considerable number of star occultations at Albany and worked out the longitude of the place. In 1831 he went to Maryland to observe the annular eclipse of February 12th, and ever after was enthusiastic and indefatigable in the pursuit of such phenomena, never losing an opportunity.

In 1834 he went to Georgia to observe the total eclipse of that year, exulting in the possession of a fine $3\frac{1}{2}$ -inch telescope by Fraunhofer, which had just been presented to the college by some of its liberal friends. This instrument was his pride and delight to the very end of his life. Not long before his death he had been looking at Saturn with it early one evening and afterwards came over to the Halsted Observatory to take a look at the same object with the great 23-inch telescope then newly mounted. We had a magnificent view, but, as I accompanied him to the door, he stopped and said in his peculiar way: "Yes; you have more light, but the little Fraunhofer holds its own *amazingly* well."

At the time when it was procured, however, if I am not mistaken, "the little Fraunhofer" had no superior in the country except the 5-inch Dollond telescope presented by Mr. Clark to Yale College four years earlier. I have never seen any published report of Pro-

fessor Alexander's observations of this eclipse of 1834, though I have found several allusions to them in Silliman's Journal and elsewhere.

In 1860 he was the astronomical chief of the large party sent out by the Government to observe the eclipse of that year in Labrador. The expedition was entirely successful, and its valuable results are published in the Coast Survey report for that year.

In 1869 he was the chairman of the committee appointed by this Academy to organize the observations of the eclipse of August 7th and himself took part in the observations at Ottumwa, Iowa. My own first experience in eclipse observation was at this time, and simple gratitude requires that I should put on record here how courteously and kindly he responded to my application for a place on one of the parties, and how considerately he assigned my work. In 1838, 1854, 1865, and 1875 he observed the annular eclipses of those years, though in 1875 clouds prevented anything more than a glimpse. In 1878 he was anxious to go with the Princeton party to Denver to observe the total eclipse of July 29th, but his health was then too feeble to permit such a journey. He observed it, however, at Princeton as a partial eclipse, as he had a number of others in preceding years.

In 1835, in connection with Professors Bache, Espy, and Henry, he determined the difference of longitude between Princeton and Philadelphia by observations of meteors. Although the method had been suggested more than a century before by Halley, and the suggestion had been several times renewed by others, yet, so far as I can learn, this was the first occasion on which it was actually put in practice, and the only time in the United States. A few years later it was made use of in a few instances in Germany, Ireland, and Italy. But the telegraph soon superseded all other methods for longitude purposes.

He aided Professor Henry in his thermopile observations upon sun-spots in 1845 and in many other physical researches. He observed four transits of Mercury, and in December, 1882, he closed the record of more than fifty years by a careful and satisfactory observation of the transit of Venus. I think he never put his eye to the telescope again.

But Professor Alexander's special forte was not that of the observer. He was not satisfactorily equipped with instruments or observatory. The whole astronomical outfit of Princeton College

during his professorship was hardly equivalent to that of the ordinary High School of to-day. Nor had he the time for any connected and persistent observation, nor, probably, the mechanical taste and skill, nor the physical strength and endurance necessary to distinguished success in that kind of work. He was, however, extremely anxious to get the means for careful study of the nebulae, for which purpose, of course, a large telescope is simply indispensable. He spared no efforts, therefore, to obtain such a telescope with a corresponding observatory. The observatory came first, through the liberality of his friend and admirer, General Halsted, whose name it bears. Its corner-stone was laid in 1866, and it was completed in 1872. It was nearly ten years later before the great telescope was mounted by the generous aid of other friends of the college, not, indeed, until after his retirement from the professorship. But he saw it at last, and I had the pleasure of directing it for him upon some of those remarkable objects so long familiar to him in the drawings of Herschel, Rosse, and Lassell, but which he had never before examined for himself. There was something pathetic in his exclamations of satisfaction and delight, for the great instrument, so long dreamed of, had only come too late for him to use it. He had labored, and others had entered into his labors, and were to reap the fruit; but he was unselfish, and rejoiced sincerely in the good fortune of his successor, so greatly due to his own exertions.

As was the case with all college professors thirty years ago (and still is with many of us) his time and strength were so consumed by the routine duties of the office—in the class-room and faculty meeting—that little remained for anything else. Still he accomplished a good deal with his pen. While he wrote no books and could not be called a prolific author, he published a considerable number of articles in the various scientific periodicals. The published articles are, however, few in comparison with the number of papers which he presented orally before the different scientific bodies with which he was connected. He was a fluent speaker, and rather preferred to present his subject from skeleton notes than to read a written essay, and after presenting a paper, like some of the rest of us, he greatly disliked the mechanical labor of preparing it for the press, so that the only record we have of much of his work is a mere notice or a brief abstract of a paper read on such and such a date.

Probably the most important published essays from his pen are the four following: A paper upon the "Physical Phenomena Attend-

ant upon Solar Eclipses;" one on "The Fundamental Principles of Mathematics;" one on "The Origin of the Forms and the Present Condition of the Clusters of Stars and Several of the Nebulæ," and his treatise on "Certain Harmonies of the Solar System."

The first of these was read before the American Philosophical Society of Philadelphia, at its centennial anniversary in 1843, and is published (by abstract) in the volume of Proceedings then issued. It shows a very extensive range of reading, and is an exceedingly thorough, orderly, and exhaustive summary of everything that had ever been reported as observed on such occasions. There is, however, hardly sufficient discrimination between the real and imaginary—between observations which can be depended on and others which are obviously mere fancies of an untrained observer.

The paper on the "Fundamental Principles of Mathematics" was first read before the American Association for the Advancement of Science in 1848, and afterwards published in the American Journal of Science and Art. It is an interesting, suggestive, and eloquent essay. The subject gives the author an opportunity to indulge his inherited Scotch love for metaphysics and hair-splitting distinctions, and he finds in it also opportunity for imagination and poetry to an extent which makes the paper almost unique among mathematical disquisitions.

Professor Alexander's discussion of the forms, &c., of nebulæ and star clusters appeared in Gould's *Astronomical Journal* in a series of articles running through many numbers. Its main purpose was to show that many of the nebulæ and clusters are not stars in the process of formation, but of disintegration; that the nebular condition sometimes follows instead of preceding the stellar.

Laplace's Nebular Hypothesis had always a powerful fascination for him. He made it the basis of endless speculations as to the origin and genesis of the present state of things, and though he sometimes reached conclusions difficult to reconcile with it, as commonly understood, he was always persuaded of its essential verity. His most elaborate, extensive, and undoubtedly, in his own estimate, his most important, work was the treatise upon the "Harmonies of the Solar System," published in the *Smithsonian Contributions to Knowledge* in 1875. It contains the summing up of his chief work for many years. In it he considered that he had established the existence of certain distance-determining ratios in the spacing of the planets, and also in that of their satellite systems—such relations as

might be supposed to result from the previous existence of the planets and satellites in the condition of rings analogous to those of Saturn. The spirit and method of the work resembles that of Kepler rather than that of Newton, Laplace, or the modern geometers, and quite justifies the title of the "American Kepler," conferred upon the author by a foreign critic.

As a scholar Professor Alexander was unusually broad and versatile. He was an excellent linguist, familiar with Latin, Greek, and Hebrew, and with the principal European languages, all of which he read, and several of them, I believe, he wrote and spoke with facility. He was fond of general literature, of history, biography, fiction, eloquence, and poetry, and himself wrote verses of no mean merit. He was an ardent lover of metaphysics (especially of the Scotch school), of philosophy, and of theology. He was familiar not only with the ordinary range of mathematical reading but with many works of higher order. He had large portions of the *Mechanique Celeste* almost at his fingers' ends, and was well acquainted with the works of Newton, Euler, and Lagrange. To an extent unusual in his time he also kept up with the current astronomical literature by means of the foreign journals, which were then not easy to obtain in this country.

His principal work, of course, was in the college, and there is no question that he exercised a most important influence upon the hundreds, even thousands, of pupils who came under his instruction at Princeton during his protracted term of service. Upon many of them he impressed himself deeply, and was always remembered by them with reverence and affection. As a lecturer, especially, he had the power of exciting interest and enthusiasm.

I cannot do better than to quote in this connection from an address delivered at his funeral by the Rev. Horace G. Hinsdale, his pastor, a graduate of more than thirty years' standing, who remembers our friend in the fullness of his strength and power. After speaking of Professor Alexander's distinguished associates in the Princeton faculty, Dod, Torrey, J. W. and J. A. Alexander, Hope, Henry, and Guyot, Mr. Hinsdale proceeds as follows:

"Of such associations Stephen Alexander was not unworthy. He pushed his researches into the depths of mathematical and astronomical science, availing himself of his acquaintance with the principal languages of Europe. He printed for the use of his students treatises on ratio and proportion, differential calculus, and astronomy. He was unselfish in his devotion to the

interests of the college and the advancement of learning. He aroused the admiration of his pupils by the evident extent of his knowledge and his ardor in imparting it, although it must be said that he often became so profoundly interested in setting forth the philosophy of mathematics as to forget that their acquaintance with the subject was of necessity far less than his own, and so to outrun their ability to follow and comprehend him. The closing lectures of his course in astronomy, in which he discussed the nebular hypothesis of Laplace, were characterized by a lofty and poetic eloquence, and drew to his class-room many others than the students to whom they were addressed. Even ladies from the village and elsewhere—so far did the traditional conservatism of Princeton give way before a wholesome pressure—invaded Philosophical Hall (a historic building, whose demolition is mourned by many an alumnus), and taxed to the utmost the gallantry of the collegians. I vividly recall one of the occasions of which I speak—the hushed and expectant auditory; the shy, almost abashed, manner of the lecturer; the rapt look, the glowing countenance, the throbbing frame, which indicated how completely he was possessed by his theme; the magnificent sweep of his ideas concerning the formation of the material universe with its countless suns and systems; his happy application of Scripture phrase when, pointing to the drawings of certain nebulae of remarkable form, he would quote: ‘They all shall wax old as doth a garment, and as a vesture shalt thou change them, and they shall be changed;’ the outburst of eloquence, seeming to our young minds akin to inspiration itself, with which he ascribed all the beauty and glory of creation to Him who is enthroned in majesty above all spheres, evermore controlling and guiding all, the Personal God, glorious in holiness, fearful in praises, doing wonders.”

The last sentence of this passage which I have quoted brings to notice one of the most distinctive characteristics of our friend. He was through and through religious, in his belief, in his feelings, and in his life, and in everything he said and did his Christian faith shone out.

In person he was small and slight, and during the latter years of his life frail and feeble. He probably never weighed as much as one hundred and twenty pounds in his very best estate. His countenance was refined and delicate; his manners were always gentlemanly and courteous, but usually rather retiring and reserved until some interesting topic made him forget himself; then he was fluent and even impetuous in conversation. He was modest almost to shyness, though not without a reasonable and comfortable underlying consciousness of his real worth and ability, pure of thought and speech, simple-hearted and unsuspecting as a child, gentle and quiet usually, but capable of high enthusiasm or burning indignation when occasion came. He was a good and patriotic citizen, and

an earnest and active member and officer of the church to which he belonged—always prominent in its work and counsels.

It is difficult to assign just rank on the roll of scientific honor to those who have lived and labored under circumstances widely different from our own. Obviously earlier workers cannot be fairly judged by the standards of to-day, because their means and opportunities were not those of the present time.

While some, like Franklin, Bache, and Henry, stand pre-eminent when judged by any standard, whether of the present or the past, in respect either to ability or performance, the great majority of those upon whose influence and labor the progress of science has mainly depended, stand together as an honorable body, among whom it is not easy to establish well-marked grades and ranks; and fortunately it is not necessary.

It would be a mistake to claim for Professor Alexander a rank among the pre-eminent few. He made no great discoveries, nor has he left any record of scientific work of such importance or extent as to entitle him to such a position. But there can be no question that among the more numerous class referred to he should be accorded a most honorable place. His native ability was of a high order and his influence upon his pupils by his instructions, and upon the general community by his various discourses and by his published works and observations, has contributed powerfully and effectually to the progress of his favorite science. American astronomy to-day owes much to his life and labors.

To say that he was without weaknesses or faults would be untrue of course; but I am sure of this, that few men have ever lived more blameless and useful lives, and few will be remembered by those who knew them best with more affectionate reverence than he.

One of his early friends (the Rev. George Burrows, of San Francisco), in a letter received not long before his death, writes to him thus: "I never had a friend whom I valued or admired more highly for all that is precious in purity, honor, delicacy, piety, steadfastness, and nobleness of character. I can never see you again on earth, but one of the additional attractions of heaven is the assurance of meeting you there."