

# MEMOIR OF ASA GRAY.

1810—1888.

BY

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## BIOGRAPHICAL MEMOIR OF ASA GRAY.

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Within the short space of five years the Academy has lost its three most distinguished botanists. GEORGE ENGELMANN, a German by birth, but closely identified with American science for fifty years, died in 1884; in 1886, EDWARD TUCKERMAN, the lichenologist of North America, passed away after a brief illness, and in the year just passed we have lost him whose years and learning placed him at the head of American botanists and whose name was known and respected by the scientific men of all countries. From 1833, when his first scientific paper was published, until his death, January 30, 1888, ASA GRAY was a prolific writer and an active teacher and editor, and there have been few American naturalists who were so well known or so much beloved as he was. In him an extraordinary industry and great intellectual powers were united with a vivacity and amiability which not only made him a leader among scientific men but also brought him into intimate friendly relations with a large circle who regard his death as a personal affliction.

We need not dwell upon the details of his simple and uniformly happy life, except so far as they show the source of his influence on the progress of botany in the United States and illustrate a striking phase of American scientific education in the early part of the present century, when the young naturalist was forced to depend upon his own intelligence and enthusiasm without the aid of well-equipped laboratories and large libraries and collections.

Asa Gray was born on November 18, 1810, in Sauquoit Valley, in the township of Paris, Oneida county, N. Y. His ancestors were of Scotch-Irish descent who had emigrated to Sauquoit from Massachusetts and Vermont. He was the oldest of the eight children of Moses Wiley Gray and his wife, Roxana Howard Gray. In 1810 Sauquoit was a frontier settlement, and Moses Gray combined the occupation of farmer with that of tanner. His children, who received their early instruction at home and in the small school at Sauquoit, had none of the advantages which can now be obtained in the schools even of the smaller towns. Books were scarce, but, if few, were substantial and solid, and were read with an avidity

not often found in this age of many books. Asa was a bright boy, always ready to help his father in his various duties and quick at learning the common branches taught at school; but there is nothing to show that he was precocious, or that, as a boy, he was more interested in plants than in the other natural objects with which his life in a sparsely settled region brought him in daily contact. When about twelve years old he was sent to a grammar school at Clinton, N. Y., and later, in 1825, to the Fairfield Academy, where he remained four years. There he pursued elementary mathematical and classical studies, but they must have been decidedly elementary, for apparently Greek was not included in the curriculum, or, if so, it was of the most rudimentary kind. Gray's interest in natural science was first excited while listening to the lectures of Dr. James Hadley, Professor of *Materia Medica* and Chemistry in the Fairfield Medical School, who also gave some instruction in the Academy. At first, he was more interested in minerals than in plants, and it was not until later, on reading the article on Botany in Brewster's Edinburgh Encyclopædia, that his taste for botany was developed. In the following spring he made out the name of the common *Claytonia* with the aid of Eaton's Manual, and, encouraged by this, his first success, he soon became an enthusiastic collector and student of the plants which could be found near Fairfield and Sauquoit, and the long summer vacations were utilized in making botanical and mineralogical excursions to the other parts of New York State.

Moses Gray seems to have had by this time a suspicion that his son's fondness for natural history would unfit him for the work of a practical farmer, and, in 1829, he sent him to the Fairfield Medical School. While still a student in the Academy Gray had attended some of the lectures of the Medical School, and during the intermissions of the sessions of the Medical School he continued his studies with different physicians living near Sauquoit, of whom the one from whom he derived the most profit was Dr. John F. Trowbridge, of Bridgewater. In February, 1831, he received his doctor's degree at Fairfield. Gray really never practised medicine although he opened an office, which formality marked the beginning and the end of his medical career, as it has those of a good many other medical graduates. The title of Doctor clung to him, however, and he used to relate how, many years later, when traveling in Egypt, he was forced by the natives, who heard him called Doctor by his traveling companions, to prescribe for their various ail-

ments. He certainly looked like a respectable doctor, and by the aid of a few old bottles and labels he accomplished wonderful ophthalmic cures, and was even obliged to witness the somewhat embarrassing gratitude of a poor father whose paralytic son he had cured by a judicious use of the English language.

Medical studies at that date could not have been wholly absorbing, for Gray managed, while a medical student, to collect a good-sized herbarium, to say nothing of minerals, and began a correspondence with Dr. Lewis C. Beck, of Albany, and Dr. John Torrey, of New York, which served to introduce him to the best botanical circles of the country. After graduating he became instructor in chemistry, mineralogy, and botany in Bartlett's High School, at Utica, New York, and in June, 1832, he gave his first course of public lectures on botany at the Fairfield Medical School. A little later he gave a course on mineralogy and botany at Hamilton College. With the money earned from these courses he was enabled to make botanical excursions to Niagara Falls and other parts of New York and New Jersey.

The turning point in Gray's career which made it plain to himself that he could and should devote himself to botany was the call to New York, in the autumn of 1833, to be the assistant of Professor Torrey. To be sure, Torrey was professor of chemistry rather than botany, and Gray was obliged to assist in the chemical laboratory, but the real interest of the two centered in botany, and while in New York Gray published some original papers, of which the *Monograph of the North American Species of Rhynchospora* (1835) was his first purely botanical paper, although he had in the preceding year issued the first part of a series of dried specimens of North American *Gramineæ* and *Cyperaceæ*, and in connection with Dr. J. B. Crawe had published a *Sketch of the Mineralogy of a Portion of Jefferson and St. Lawrence Counties, N. Y.*, in the *American Journal of Science*. Owing to lack of money he could not be employed as Professor Torrey's assistant after 1833, but he returned to New York in 1835 and became Curator and Librarian of the Lyceum of Natural History, and while thus occupied prepared in leisure moments his first text-book, *Elements of Botany*, which appeared in 1836. He was hard at work with Professor Torrey on the *Flora of North America*, during the summer of 1836, when he was appointed botanist of the Wilkes Exploring Expedition. But as the sailing of the expedition was, for one reason or another, post-

poned for two years, Gray, becoming weary of the many changes and delays, resigned his position. At this time a new State University had been founded in Michigan, and Gray accepted the chair of botany which was offered to him, on condition that he should be allowed to spend a year abroad in study before beginning his duties. He returned to America in November, 1839, but he never entered upon the duties of his professorship, for, owing to financial or legislative embarrassments, the services of the botanist were not at once needed in Michigan, and Gray therefore remained in New York at work on the *Flora*, of which the first volume had appeared (1838-1840), and the second, then well under way, was completed in 1843.

During a short visit to Boston and Cambridge Gray had made a favorable impression on President Quincy, of Harvard College, and soon after his return to New York he was offered the newly endowed Fisher Professorship of Natural History at Harvard, which he accepted. He removed to Cambridge in 1842 and entered upon his duties. On May 4, 1848, he was married to Miss Jane Lathrop Loring, daughter of Mr. Charles G. Loring, of Boston, who still survives. From this time his life ran smoothly on. He was now able to devote himself wholly to botany and the building up of the botanical establishment at Harvard University, which he may be said, in fact, to have created. He brought together books and plants and gathered round himself numerous students, young and old, who wished to profit by his knowledge and the botanical treasures which he had accumulated. From Cambridge his influence extended in ever-widening circles until, as time went on, he became the one man to whom American botanists looked for advice, sympathy, and inspiration. With age came respect and honors from home and from abroad, and even time dealt kindly with him, for he was still as fresh, as active, as cheerful as ever when he returned from his last European journey, in October, 1887, and turned with renewed zeal to his work on the *Flora*, which he was destined never to complete, for, on the morning of November 28, he was stricken with paralysis and lingered in a partially conscious condition until the evening of January 30.

The life of Asa Gray fills some of the brightest pages in the history of American science. He occupied a place in the public esteem which no other botanist had ever held, and his death leaves a gap which cannot be filled. It is one of those rare cases where the right man appeared at the right moment. There had been many and

good botanists in America before his day, but they were forced from their own necessities and the state of science in their time to do the rougher work of exploration, or, if they attempted other work, to do it at a disadvantage. Some were poor and wandered from place to place, living as best they could. Others could only devote leisure moments to botanical studies after their best hours had been spent in business or the drudgery of teaching. Even the most favored worked at a great disadvantage, in the absence of large herbaria and special libraries. Their work was perhaps the best that could have been expected under the circumstances, and although its value was fully appreciated by the small botanical public, it was too scattered and fragmentary to reach the larger public and make itself felt on the large body of those who, although they recognized the value of physics and chemistry, had not yet learned that botany, too, was a science and not merely the amusement of a few mild-minded, odd-looking people. Botanists themselves needed some one who could bring together the scattered materials of the early explorers and harmonize the writings of earlier botanists into a compact and comprehensive whole; one who could settle authoritatively doubtful points of nomenclature; who could describe species tersely and clearly so that there might be a good general account of the flora of North America comparable with similar floras of Europe. The public needed some one to tell them what botany itself was and what botanists were doing. Evidently he must be a rare man who could hope successfully to perform two so widely different tasks. The works of Pursh, Michaux, Nuttall, and others had made an admirable beginning, and had Torrey not been forced to live by his chemistry, he might, perhaps, have accomplished the former task alone. Or what might not have been expected of Engelmann, thoroughly trained in the best European schools, had he been free from the demands of an active professional life? But neither Torrey nor Engelmann, in spite of their scientific attainments, could have accomplished the second task, for which Gray was peculiarly fitted. Combining the power of original research with a talent for popular exposition, he was just the man for the time. Younger than his friend and teacher, Torrey, by fourteen years, he began his botanical studies at a fortunate period. The artificial system of Linnæus was beginning to yield to the natural system, and Gray began with the new school of systematists who were destined to carry all before them, and he lived to be a prominent

defender of the still newer school of Darwin, which sees in species not fixed creations but stepping-stones in a grand progress from below upwards. But we should not suppose that in 1836 Gray accepted the natural system merely perfunctorily. At that time it required some courage to advocate a system to which most American botanists were opposed, just as in 1859 it required courage to defend a theory regarded by many naturalists, as well as by the general public, as atheistic. In his *Elements of Botany* he had to defend the natural system, and while most of the notices of that book were commendatory they were also largely apologetic.

At the outset of his career Gray recognized that the first step in the development of the botany of any country must be the description and classification of its phænogamous species. That step once taken the way is open to studies of another kind. He turned his whole energy in this direction and did his best to accomplish the task, and, although death interrupted him in the midst of his labors, the work was so far advanced that it can be completed by his fellow-worker, Sereno Watson. The first conception of the *Flora* originated with Torrey, and under his able and friendly guidance Gray made rapid progress and soon rivalled his master as a systematic writer. But neither Torrey nor Gray had any real conception of the magnitude of the task they had undertaken. Material accumulated so rapidly that before the two volumes of the original *Flora* were finished it was evident that they must at once be revised. In his first visit to Europe, November, 1838, to November, 1839, Gray visited all the leading herbaria of Europe, from Padua to Berlin and Glasgow, examining carefully the types of North American species, and became personally acquainted with several of the early explorers, as Menzies and Auguste Saint-Hilaire. He was everywhere favorably received and his agreeable manners and botanical enthusiasm attracted the attention of the leading botanists, such as R. Brown, Sir W. J. Hooker, and A. P. De Candolle, and formed the basis of an enduring friendship with the younger men of promise, as A. De Candolle, Sir J. D. Hooker, and Decaisne.

The second volume of the Torrey and Gray *Flora*, ending with *Compositæ*, was published soon after Gray settled in Cambridge, but the work was never to be continued, for Gray had now formed a plan of writing a new *Flora* on a more extended scale. At Harvard he could devote most of his time to the work, for his professorial duties were not, at first, very onerous. But there was practically no

botanical library or herbarium, except what he had brought with him to his new home. The Botanic Garden in Cambridge was founded in 1805, and W. D. Peck was director and professor of botany until his death, in 1822. The endowment was then so small that a professor could not be appointed, but Thomas Nuttall was made Curator of the garden and afterwards Lecturer on Botany. He resigned in 1833, dissatisfied with his position, and the garden was then left in charge of a gardener until the arrival of Gray, in 1842. Before good work could be done it was necessary to have books and specimens, and Gray set to work to collect these. A salary of \$1,000, which was all that he received for some years, would not now seem to us to afford much opportunity for purchasing books and plants. But Gray was trained to be frugal, and he soon managed on this scanty income, with absolutely no property of his own, to bring together a large library and to create an admirable herbarium. The small house in the Garden in which he lived at last became so crammed with books and plants that it might almost be said that guests had to sleep on plants, and that the china closet had become a library. In 1864, dreading the danger from fire, he offered to present his collections to the college on condition that a suitable building should be erected for their reception. His offer was accepted and a small brick building was built connecting with his house, and afterwards a small library was added. In 1865, when presented to the college, it was estimated that the herbarium contained at least 200,000 specimens and the library about 2,200 works, not including pamphlets. Their money value is well up in the thousands, and in these days, when the names of those who have given a tithe of their wealth to educational institutions are loudly proclaimed in the papers, we may well ask that the name of him who by his frugality and industry was able to give so large a sum to his adopted alma mater should appear prominently in the roll of her benefactors. At the time of Gray's death the herbarium was probably double the size that it was in 1865, and it is now by far the largest and most valuable herbarium in America, excelled by but few of the older herbaria of Europe, and has been the resort of nearly all the botanists who have within the last thirty years written concerning North American Phanogams.

The greater part of Gray's scientific work during the thirty-five years following the completion of the second volume of Torrey and



Gray's *Flora* had a more or less direct bearing on the contemplated revision and enlargement of that work. An immense number of monographs of different genera and orders, reports on the collections of different expeditions, notes on structure and nomenclature were published in the journals and proceedings of societies in this country and abroad, and at length, after this elaborate preparation, the first part of the *Synoptical Flora*, including the *Gamopetalæ* after *Compositæ*, appeared in 1878. A second part, including from *Caprifoliaceæ* through *Compositæ*, appeared in 1884. In 1886 supplements to both parts were issued, and he was at work on the *Polypetalæ* and had nearly finished the *Vitaceæ* when attacked by his last illness.

Gray was pre-eminently a systematist, not because he underestimated the value of other work, for he encouraged younger men to devote themselves to other departments of botany and was always interested in their success, but rather because systematic work was what was most needed in his day and that for which he himself was best fitted. He did well to limit himself to this field, where he felt sure of his ground. His quick eye, which enabled him to catch the essential features of any plant at a glance; his clear judgment, which distinguished between what was constant and typical and what was accidental and variable; his remarkable memory, his clear, terse style, placed him at the head of American systematists and made him rank with the great botanists of the world. He has been compared with the elder De Candolle, whom he certainly much resembled in the method of his work and his manner of writing. He had a wider knowledge of North American Phænogams than any other botanist, and in his knowledge of the *Compositæ*, the largest order of flowering plants, he was unequalled.

But Gray was more than a systematist. His mind looked beyond mere classification and description and sought to solve the perplexing question of plant-distribution. As early as 1840, if we may judge from a review of Siebold's *Flora Japonica* in the American Journal of Science, he was struck with the resemblance of the flora of Japan to that of Eastern North America. His first paper on plant-distribution (1856), entitled *Statistics of the Flora of the Northern United States*, was written partly in response to a request from Darwin for a list of American alpine plants. Here he showed by means of tables the comparative distribution of species in Europe, Asia, and North America, and announced the fact that the

resemblance of our flora to that of Europe is due not to the large proportion of genera common to the two continents, but rather to the number of identical or closely related species, while, on the other hand, the number of characteristic genera common to the Eastern United States and Eastern temperate Asia is remarkable, and a very ancient dispersion was suggested to account for some anomalous cases. It was, however, a study of the Japanese plants collected by Charles Wright, the botanist of the North Pacific Expedition of Ringgold and Rodgers, which enabled Gray to arrive at the far-reaching results on which his fame as a philosophical naturalist principally rests. His paper *On the Botany of Japan and its Relations to that of North America and of other Parts of the Northern Temperate Zone* was a masterpiece, in which he showed the relations of the floras of the North Temperate regions, accounting for the present distribution by migration of species from the Arctic regions due principally to the different climatic conditions of the pre-glacial, glacial, and post-glacial eras.

To understand the gradual change in Gray's views as to the nature of species it is only necessary to compare his review of the *Vestiges of Creation*, written when he was 36, with the paper on the *Botany of Japan*, to which we have just referred, written when he was 12 years older. The review is very interesting and suggestive, but there is in it something of impetuosity and assertiveness which suggests immaturity. It represents the views of what the writer thinks, on general grounds, ought to be true. The latter paper states what, after careful inquiry, he has found to be true. In 1846 he believed firmly that species "were created as perfect as they now are." After the lapse of twelve years he had become convinced that the present species are not special creations, but modified forms derived from pre-glacial ancestors. His own special studies having brought him to this conclusion, it was natural that he should look with favor upon Darwin's *Origin of Species* when it appeared, in 1859. In fact, Darwin's views were already known to Gray, for the two had been in intimate correspondence since 1855, and Gray was one of the three persons to whom advance sheets of the *Origin of Species* had been sent before its publication. To Gray there was nothing alarming or irreligious in the theory of evolution. Although a devoted member of the Congregational Church he was not frightened by the general cry of atheism with which the new book was greeted. He showed a truly scientific spirit in his discussion of the

question and was considered by Darwin himself to be the best expounder of his views. His presentation of Darwin's views was, in fact, so clear and open that it has often been said that Gray accepted Darwinism to its full extent. But this is a mistake. He was indeed candid in representing Darwin's views in such an attractive and impartial manner as to disarm those who attacked them as irreligious and opposed to design on the part of a Creator, but he never professed to follow Darwin beyond a certain point. Gray considered that natural selection is, on the whole, a good working hypothesis, but cannot explain how wholly new parts are initiated, even if the new organs are developed little by little. He denied that natural selection accounts for variation. The power to vary once given, then natural selection will account for the present forms of life. But whence comes the capacity for variation? Gray differed with Darwin in believing that variation occurs in certain more or less regular directions, and particularly in beneficial directions, by virtue of some inherent power imparted in the beginning by Divine agency. But this is a restatement of the problem in another form rather than a scientific explanation. Theology may speak of an inherent power, but Science will still ask, What is that power? Again, what is meant by beneficial? The word is ambiguous, for, since only those variations which tend to enable living beings to survive in the struggle for existence can, in the long run, be called beneficial, if we assert that variation acts generally in beneficial directions we are the same as saying that variations generally tend to enable existing beings to survive, which is by no means evident. But, whether we adopt Gray's modification of Darwinism or not, we must admire his impartial statement of Darwin's case at a time when many of our leading naturalists treated the question with scorn, if they did not go farther and indulge in abusive remarks concerning one now ranked among the bright lights of science.

While Gray's purely scientific writings gave him a high place among botanists he exercised a powerful influence in a larger sphere through his work as a teacher and writer of educational works and through his numerous papers of a popular character. In the classroom he came in contact with a large number of students, now scattered in different parts of the country, who recall with pleasure the genial instructor so absorbed in his subject that he assumed that every one else must be equally interested in it. As an extempo-

aneous lecturer Gray was not especially fluent, but there was an eloquence in his simplicity and earnestness. Upon the more advanced students who at different times worked under his direction in the herbarium he made a deep impression. They were treated rather like younger friends than students. The first thing was to work and work conscientiously, but solemnity and the appearance of excessive wisdom were discouraged. One was taught to work with a will and for the love of botany itself, not for the sake of making a display of learning. He detested shams and nothing pleased him more than to prick the bubble of pomposity or, by some well-timed remark, to check the stream of those who talked for the sake of talking. Once, on listening to a lecturer who had the habit of saying very little in a great many words, he said to the writer: "Don't ever lecture *about* botany. When you lecture, say something." Vagueness was also discouraged. The student had it impressed upon him that there should be some definite point to his work; that the end of scientific activity should not be an indefinite general culture.

The numerous editions of Gray's *Text-Book* made his name known in all the higher schools of the country, and the *Manual of the Botany of the Northern United States*—a work which may be enlarged by future discoveries, but whose general character could hardly be improved—made it possible for any one to gain an accurate systematic knowledge of the flowering plants of the region, while the attractive little books, *How Plants Grow* and *How Plants Behave*, were the means of inducing many to enter upon a study which they afterwards pursued with pleasure and profit. By these works, as well as by his papers on Darwinism, Gray became not only a recognized scientific authority, but his opinion on all sorts of topics, religious, philosophical, etc., was sought by the journals of the day, and such was his fertility and good nature that he generally wrote articles at their request even against the wishes of some of his scientific friends.

In his descriptive works Gray's style is marked by clearness and a singularly happy use of short, expressive sentences, and his general and popular essays are written in a style which would do credit to any cultured literary man. There is none of the crudeness, the slovenliness, or the awkwardness which too often mar the writings of scientific men who, however learned they may be in their own department, are frequently either unable or unwilling to take the

trouble to express themselves clearly and in correct language. The excellence of Gray's style as well as his great fertility is well seen in the immense number of reviews and notices in the *American Journal of Science*, with which he was connected as editor for more than thirty years, and in his numerous papers on Darwinism. The sentences flow smoothly and gracefully along, relieved by numerous apt similes and brightened by sparkles of delicious humor. The number and variety of the reviews are something extraordinary. He had a passion for reviewing, and no matter how fatigued he might be with the day's work he seemed always to be ready to refresh himself in the evening with another review. As a critic of other men's work he was discriminating without being ill-natured, and it is probable that few persons could have written so many reviews without making for themselves a host of enemies. But Gray was on good terms with nearly all the world. In fact, it was to his own happy disposition that his success was in part due. Had he been morose and repelled his contemporaries it might have been left to a future generation by digging and delving to ascertain his greatness as a botanist. But he was of an even, cheerful disposition, and believed in being happy himself and in making those about him happy. With a kind heart, a clear head, and a vigorous body he was convivial as well as learned, and was as much a man of the world as one who loves his science can afford to be. He was at home in any society, no matter how distinguished, always entertaining and not merely entertained; self-possessed without being self-conscious. Not a distinguisher of persons, but uniformly kind and sincere, it is no wonder that he was beloved wherever he was known.

But I need not recall to you, members of the Academy, his attractive ways. His face was long familiar to you. He was often seen here either in attendance on the sessions of the Academy or in discharge of his duties as a member of the Board of Regents of the Smithsonian Institution, and you have often met him at scientific gatherings elsewhere. You know that he was always quick-witted, running over with anecdotes, and always eager to hear what was going on in the scientific world. And some of you will recall hours spent in his quiet home at Cambridge among his books and flowers, his only children. His whole life was as beautiful as it was fortunate. He found a country in which a few botanists were struggling against general neglect and popular ignorance. He left a great nation in which, very largely through his exertions, the value of

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botany had become generally recognized and in which a crowd of young workers had arisen anxious to carry out the good work even in the most remote regions. But the times have changed and the range of botany has become so wide that, although we may have good botanists in the future as well as in the past, it is hardly likely that hereafter any single botanist will hold the same comparative place in public esteem as that filled by Asa Gray in his day.

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A list of the writings of Prof. GRAY will be found in the appendix to Vol. XXXVI of the American Journal of Science for 1888.