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MARSHALL AVERY HOWE

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A Biographical Memoir by

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Marshall Avery Howe was born at Newfane, Vermont, on June 6, 1867, and departed this life at his home in Pleasantville, Westchester County, New York, on December 24, 1936, in his seventieth year. At the time of his passing he occupied the position of Director of the New York Botanical Garden.

Marshall Avery Howe was the eldest of five children of Marshall Otis and Gertrude Isabelle Dexter Howe, both parents belonging to old Vermont families of English origin, remarkable for their longevity, their intellectual interests, and, particularly in the case of both his father and mother, for their scholarly inclinations and accomplishments. Both father and mother seem to have been interested in botany, among other nature subjects. Both parents seem to have been of that student and reading class, many of whom existed in rural New England even beyond the middle decades of the Nineteenth Century and whose influence for healthful living and logical thinking had its lasting effect upon their progeny and communicated itself to the community. Marshall Avery Howe was named after his father, Marshall Otis Howe (1832-1919) and his maternal grandfather, Avery Joseph Dexter (1818-1893) and was ever particularly insistent on the use of his full name, which is thoroughly distinctive.

With such parentage and ancestry, it is little wonder that Marshall Avery Howe not only showed forth early his propensities for study, but we can well believe that he received both sympathy and practical encouragement from his parents as well as the esteem and admiration of his fellow townsmen. Since the details of parentage, early education and influences are of such importance in the rounding out and shaping of a career, it seems best to quote several paragraphs of a letter from his brother, Professor Clifton Durant Howe, Dean of the Faculty of Forestry of the University of Toronto, who has kindly supplied them for the information of the writer of this memoir.

"First, in regard to our background, I know hardly anything about my father's ancestors except from general knowledge. I think he was a mutant. His father was a farmer for most of his life; in the earlier part of his life he was a fuller. From the few things I remember my father saying, it is probable that his mother had greater mentality than his father. My father had two sisters and one brother who lived to be in the late twenties and thirties, but who were not outstanding in any way, in fact they all three died of what was then called 'quick consumption.' My father also contracted the disease and was given only a few years to live by his doctors. He had prepared himself for the law and was nearly ready to be admitted to the bar when he began to have hemorrhages. The doctor told him the only chance he had of living, and that for only a few years, was to farm. He married a strong healthy woman and had five boys, all robust and healthy and Marshall's death was the first among them.

"My father lived on a farm all his life but I can hardly say that he got his living by farming. He wasn't strong and robust enough to eke a living out of one of those stony New England farms. The Yankee trading instinct was fairly well developed in him. He made more money buying and selling live stock than he made from agricultural crop production. At one time he even bought raw furs from the trappers in the county. For thirty years or so he was agricultural editor of the local rural paper, furnishing a column every week, and I think got originally two dollars and a half for it and in the end he may have got up as high as five dollars. He wrote particularly upon the trend of agriculture in Vermont, a downward trend which began just after the Civil War and has continued ever since. These articles attracted a good deal of attention outside the state and he was asked to contribute, I remember, to the New England Homestead and to some of the New England magazines. He always took a great interest in education and was superintendent of the schools of the township for twenty-five or thirty years. He was the old-fashioned type of naturalist, interested in all forms of life. He collected plants, specialized particularly upon the grasses and sedges. I can remember that he sent some speci-

mens to old Sereno Watson at Harvard who did not even place his plant in the right genus. My father kept at him until he acknowledged his mistake. He knew all the minerals and collected them. We still have several barrels of his minerals in the barn at the old farm, but the labels have been lost and they are not good for much now. He organized an agricultural library in Newfane village which later grew into a very fine town library. Although he never made any money farming, himself, he knew how it should be done and was the first man in his community to spray his potato vines. He introduced a leguminous crop in the rotation. He also introduced the Jersey cow into the community. He practised forestry in his woodlot except that he did not know it by that name. As boys we were not allowed to cut any straight growing young trees, we were not even allowed to put a straight pole on the old-fashioned pole fences. His care of the hundred acre woodlot served a good purpose, for the revenue from the sale of it, when he became too old to work, supported him for quite a number of years. When I was talking about my father's health as a young man I intended to add that he died in his eighty-seventh year.

"I think, of course, that my mother was an exceptional woman. She taught a country school before she was sixteen years of age. When she was very young, about twenty years old, she made a herbarium of local plants. I still have it and it is in fairly good condition. At intervals during her youth and early married life she contributed short poems to the local papers, all rather philosophical. She organized a circulating magazine club and a discussion club among her neighbors. I can remember one winter when the women met at our house to study some of Shakespeare's plays and at another time Browning's poems. My mother was in her eighty-sixth year when she died.

"Marshall was the first born and was always precocious in his school work. He completed his matriculation Latin and his mathematics by the time he was fourteen years old and this was done mostly in the public school. In those days many of the public school teachers were part way or all the way through college. I can distinctly remember Marshall trudging off to the village on a winter's night, after the farm chores were done, to

recite Latin lessons to the district school teacher. I can also remember my mother drilling him in conjugations and declensions although she was mostly self taught in Latin. He taught his first school before entering high school. I think it was the winter before he was sixteen. He never really went to high school, as we understand the term now, but to one of those good old New England academies or seminaries at the present time nearly extinct. I do not think he spent more than two years actual time in one of those. He taught the winter term in the country schools to earn money for his board and tuition. The principal of the Glenwood Classical Institute of West Brattleboro, from which Marshall graduated was a very scholarly man and he took Marshall far beyond his matriculation requirements in nearly all his subjects. He thought so much of Marshall's attainments that he persuaded him to go back to him to teach Latin for a term during his sophomore year at the University of Vermont. I think Marshall was then in his twentieth year. Although the principal of the school was very fond of Marshall and tried to keep him, his influence must have been towards the study of the classics rather than botany.

"I really think the greatest influence was due to his lifelong friend, fellow-townsman, and fellow-classmate at the University of Vermont, Dr. Abel J. Grout. I think that Abel got interested in mosses before Marshall had thought of specializing in anything. When he did get down to this, he took up the Hepaticae so that he and Abel could work as closely together as possible. The Hepaticae were Marshall's predominant interest when he went to California and, as you know, his first considerable publication was concerned with them. I think his interest turned to marine algae while he was in California. Anyway, I can remember that he began collecting at that time.

"Naturally I feel that Marshall got his real start from the chromosomes that he inherited from his parents and to their continuous encouragement and example in guiding him in the paths of natural history.

"In reading over this letter after it was typed I perceive that I have ignored some of your suggestions. First, in regard to Marshall's early interest in botany, I can hardly remember when

he was not 'puttering' with plants. It certainly began before he left the public school. I can remember his using the oven in the summer kitchen stove in which to dry his 'blotters' and that he changed them very frequently to prevent the discoloration of the plants. Even as a boy he made complete and neat mounts."

Marshall Avery Howe was graduated from the University of Vermont in 1890 with the degree of Ph.B. He, like Sabbatini's hero, Bellarion, had no Greek, so he was constrained to follow the "Latin Scientific" course. He took the Freshman Latin Prize, was awarded distinction in Latin, French, chemistry, physics, mathematics, and zoology. He was elected "Class Leader" by his fellow students. Dr. Abel J. Grout, his roommate and chum, has spoken feelingly of these years in his sketch in "The Bryologist" (40:33-38, 1937, with portrait).

From both Dr. Grout and Marshall's brother, Clifton, it is evident that George H. Perkins, Professor of Natural History in the University of Vermont, must have had a most favorable influence on shaping the trend of the biological activity of both Marshall and his friend Grout. Professor L. R. Jones did not arrive at the University until Marshall's senior year.

On leaving college, Marshall Avery Howe taught almost a year in the Brattleboro High School, but was called, in the late summer of 1891, to the University of California at Berkeley, as Instructor in Cryptogamic Botany. The selection of young Howe was due to Edward Lee Greene, the Professor of Botany and "Head" of the Department. The steps leading to this selection must be interesting, for Greene was not in botanical sympathy at that time with most of his university colleagues of the country, but, at present, those steps are not clear. Young Howe apparently was not particularly happy during the earlier of the five years he spent in Berkeley, but was becoming reconciled to it about the time (1895) that Greene decided to leave the University of California for the Catholic University at Washington. The successor to Greene at the University of California (the writer) was a cryptogamic botanist, thus making two in the same general line at the University of California, and, as it did seem necessary to represent other divisions of botany, Howe resigned

at the end of the 1895-1896 college year to accept a fellowship in Columbia University of New York City.

The period of sojourn in California induced a series of lines of specialization on even such a conservative and deliberate New Englander (and a "Vermonter") as young Howe. His ancestry, working under such an environment as surrounded the brilliant, although opinionated and erratic Edward Lee Greene, put into expression his first dozen botanical articles of one type or another. Howe, even when younger, was slow and deliberate, although articulate and clear. Greene believed in publication, as well as preparation for, and planning for, publication. For *Pittonia* and for *Erythea,* journals conducted by, or founded by, Greene, Howe began his articles, notes, and reviews, having to do largely with Hepaticology (or Bryology) and the suggestions, or at least the influence, of Greene may be seen in the three "Chapters in early history of Hepaticology" (Erythea, 1894-1895). When Howe left California he took with him a very considerable collection of Californian Bryophytes for his future work. He had also made a beginning in Phycology, the other and perhaps preponderant specialty of his professional life. His paper entitled "A month on the shores of Monterey Bay" (Erythea, 1893) contained a report on, as well as a list of, the marine algae he collected, named after consultation with W. G. Farlow of Harvard and the Californian phycologist, Dr. C. L. Anderson of Santa Cruz, California. This "month," as well as other experience of marine algae, was prophetic, but Howe left California to continue his studies in Hepaticology with L. M. Underwood at Columbia University, and continued with certain of the groups of Hepaticae until the end of his life, but his phycological interests recrudesced after his connection with the New York Botanical Garden (1901) and his most distinctive botanical trend was with the marine algae.

Marshall Avery Howe received the degree of Ph.D. from Columbia University in 1898, and from 1898 to 1901 he was a Curator of the University Herbarium, at a time when the efforts of Nathaniel Lord Britton (Professor of Botany at Columbia) for creating the New York Botanical Garden in Bronx Park were materializing. In 1900, the main building of the Garden

was available for use and the herbarium of Columbia University was deposited in it. In 1901, Howe became a member of the Garden scientific staff and in 1906 was advanced to a full curatorship. From 1901 until his death in 1936, Howe was definitely associated with the New York Botanical Garden, being appointed Assistant Director in 1923, and finally, October 1, 1935, he was made Director, after the resignation of Elmer Drew Merrill. It now remains to outline as much as possible of his very varied and effective activities during his 35 years of official connection with the New York Botanical Garden, as collector, arranger of numerous exhibits, morphologist, taxonomist, and distributor of algae and hepaticae; likewise as editor, administrator, and expert and cultivator of dahlias and other ornamentals as educational exhibits. Much may be said, and with profit, about his activities along each and every one of these lines.

The New York Botanical Garden was organized to assemble as much as was possible and profitable of plants, both living and preserved either in proper liquids or dried. Much collecting must necessarily be done and the plants properly prepared for greenhouse, garden, museum, or herbarium, not neglecting material for exchange with other botanical institutions. Members of the staff, specialists, proceeded to various portions of the Atlantic seaboard and the West Indies (Britton's particular interest) for exploration of their floral content and for the critical study of, and report upon, these. The scheme proved effective and, from comparatively small collections, the institution has increased to one whose resources along plant lines are commensurate with the largest and best of its kind.

Beginning with his official connection with the New York Botanical Garden in 1901, Howe entered upon a full life, more intensive in field activities, in the preparation of museum and herbarium material, but continued to issue reports on the material assembled, at first chiefly general, later more and more special, as the algae of the explorations were worked over, the specimens distributed into the herbarium and museum, and the duplicate numbers sent out in profitable exchange.

It is not necessary to follow Howe in all his expeditions to

procure algae for the New York Botanical Garden and for distribution to other similar institutions, but some of the principal ones may be mentioned with profit. In 1900, he visited Bermuda; in 1901 he explored certain coasts of Nova Scotia and Newfoundland; in 1903, the Florida coasts were his objective and were touched again incidentally in 1904, 1909, and in 1914; Porto Rico in 1903 and again in 1915; the Bahama Islands in 1904 and 1908; Jamaica in 1907 and 1909; Panama and Colon in 1910; and Cuba in 1915. From all these and other places, Howe brought back a wealth of algae and other plants for both the material and scientific uses of his institution. Through his recommendation and through the private generosity of Director Britton, various algal herbaria were obtained in their entirety, such as that of Nicolas Pike, containing many specimens early collected from both coasts of North America and from the Island of Mauritius; that of the pioneer phycologist, Dr. C. L. Anderson of Santa Cruz, California, containing much of the California algal flora; and that of Frank S. Collins of Malden, Mass., fairly complete as to New England algae, North American Pacific Coast algae, and a wealth of exotic algae from all coasts of the world obtained by Collins in his exchanges with prominent collectors and phycological authorities of most of the civilized countries. In all, the collections of Algae at the Garden were augmented to 78,229 specimens and those of Hepaticae to 59,240 specimens during Howe's curatorship. The herbarium specimens are accompanied by thousands of microscope slides, prepared in connection with his critical studies, and the exhibit of Algae in the museum is not only extensive but most representative. Many thousands of specimens, most of them with printed labels, were sent out to the leading herbaria of the world and are of the utmost value in following out, critically, his numerous publications.

Marshall Avery Howe did not confine himself solely to the particular groups of plants assigned to his curatorship, but extended his interests and his usefulness to other lines of activity of the New York Botanical Garden. His home interest in ornamentals extended to the Garden. His major project at the Garden concerned the dahlias. Through his energy, care, and

careful planning, there was, during the last years of his life, a splendid collection of these ornamentals grown for display and horticultural study. The stands were excellent. Many horticultural varieties were represented, carefully named, with sources indicated, and they were effectively grouped. The autumnal display of dahlias was one of the popular and professional features of the Garden. Along with this went continuous publication of various papers, to extend the knowledge of varieties and methods of culture and care of dahlias.

Another series of "duties" which came with the curatorship was taking over the matter of editing and providing copy for the bulletins and reports of the Garden itself, or concerning some one or other of its features, for outside information. It seems that Howe was admirably adapted for this type of work, and from 1924 to his death he was editor of the *"Journal of the New York Botanical Garden."* His services were also called upon by the Torrey Botanical Club, and he was editor of its journal, *"Torreya"* and of its *"Bulletin of the Torrey Botanical Club"* for some time. He wrote many reviews of current literature in connection with these duties. His editorial and publicity work came in particularly in connection with the increasing executive work for the Garden, until he was finally definitely appointed Assistant Director (1923) and ultimately Director (1935).

All through his scientific and administrative career Marshall Avery Howe continued his research work, which falls principally under three heads: Hepaticology; Phycology, including the work of the calcareous Algae; and finally, ornamental plants, most largely dahlias. At first Howe was more generally Cryptogamic, and, although one finds nothing regarding Fungi, even in his earliest papers, Ferns, Mosses, Liverworts, and Algae were all passed under review. At the time of his leaving California there was strong impression that the Liverworts were to be his specialty and that seemingly led him to Columbia University and to Lucien Marcus Underwood. He retained his interest in this group, more particularly in the Ricciaceae and the Anthocerotaceae, until the last, but his main effort was more largely devoted, soon after he had finished up his monograph of

the California Liverworts (his doctor's thesis) to the marine Algae. In the latter years of his life, the dahlias came in and he was most active in their connection. By this time also, increasing administrative and editorial work must have cut seriously into his time and energy.

Hepaticology, as has been noted above, was Howe's earliest specialty, although his very first paper (1892) dealt with two Pacific North American Algae (*Fucus evanescens* Ag. and *Gigartina radula* Ag., together with notes on an abnormal form of a grass from Vermont). His most ambitious work on Hepatics was his "The Hepaticae and Anthocerotes of California" (1899), a work based on his five years of collecting in California and attendant and subsequent study. In this work are to be recognized the Marshall Avery Howe characteristics of careful and complete studies of morphology, taxonomic identity, as well as independence, and free discussion of relationships. The descriptions are drawn up by Howe in the full and extended fashion always employed by him and partly due to his own thoroughgoing fashion, possibly, in part, a reflection of the phytographic ideas of E. L. Greene, but more probably representing the meticulous ideas of the author himself. Howe believed in detailed descriptions, which became long, but never involved, and he continued this practice throughout his career.

After the publication on California Hepatics and the beginning of the papers on Algae (1901), the latter activity usurped the field and Howe retained chiefly the Ricciaceae, Sphaerocarpaceae, Riellaceae, and Anthocerotaceae, some of which he continued in cultivation, finally presenting some of these families (partly in collaboration with Caroline Coventry Haynes) in monographic form to Britton and Brown's "North American Flora" (1923). He still continued to be the leading authority in these families and contributed sporadically to the furthering of our knowledge concerning them. He also described (1922, in connection with Arthur Hollick) a presumably fossil Hepatic, under the name of *Jungermanniopsis Cockerellii,* from a Miocene shale in Colorado.

Marshall Avery Howe will, however, chiefly be remembered and estimated as a phycologist. Passing over the two earlier

papers dealing with certain of the marine Algae of California, the beginning of the new outlook came in 1901, when fresh from meeting the representatives of the marine flora of West Indian affinities at Bermuda (1900), he began with a paper dealing with certain of the calcareous green Algae (*"Acicularia"* and *"Acetabulum"*) of that flora. After exploring farther into the Florida and West Indian waters, he published more papers on the calcareous green Algae as well as some on non-calcareous Algae of this and other groups. Finally there came the papers (in connection with M. Foslie) on the "Nullipores" proper, or crustaceous calcareous red Algae, together with insight into their function in reef building, contributions towards our knowledge of marine sediments, etc. The ultimate result of this experience was the identification of certain of them as components of tertiary rocks in the Canal Zone (1918), on certain of the West Indian Islands (1922), from California (1934), and even from the Jurassic rocks of Montana (1925).

Marshall Avery Howe's studies on the marine Algae of the West Indian Islands, although not representing all that he published on marine Algae, stand with those of other writers as preeminent. He added much to our knowledge of the morphology, development, and taxonomy of all the groups of marine Algae and much elimination of confusion was accomplished by his critical examination of algal specimens during a trip to the older herbaria of Europe (1904) for the purpose of studying the type specimens of American marine Algae therein preserved. From the extensive notes of his studies and about 300 photographs to show habit, Howe was in a far better position to correlate his own studies on the shores, with what had been written or postulated by earlier and contemporary writers than were any of his predecessors. He certainly made full use of these unusual facilities and was a prominent factor in bringing order out of chaos throughout the extensive and most important West Indian marine flora.

In the West Indian marine flora, Marshall Avery Howe found the principal motive of his research work. The Caribbean Sea is a closed area of warm tropical and subtropical waters, characterized by its abundance of Corals and calcareous Algae. It

is a relatively shallow basin, largely segregated from the Atlantic by an island chain (the Greater and Lesser Antilles); from the Mediterranean, with which it has affinities, by the breadth of the Atlantic Ocean; and from the East Indian seas, with which it also has affinities, by the central American land mass and the Isthmus of Panama, as well as by the northern breadth of the Pacific Ocean. In many ways, it recalls, as do also the Mediterranean and East Indian seas, the conditions of the ancient Tethys. Howe realized more and more the especial problems of this remarkable body of water and, as his experience and knowledge of its calcareous marine Algae developed, he began to see more and more the relations between them and world problems. To many of us, the contributions towards solving the problems of the calcareous Algae were the most important of Howe's scientific life. A brief résumé of these may therefore be attempted, to elucidate his attitude toward them.

Among the calcareous Algae, so abundant on the coasts of the Caribbean Islands, Marshall Avery Howe first attacked those belonging to the Chlorophyceae (or green Algae). He most thoroughly investigated the West Indian species of *Acicularia, Acetabulum* (*Acetabularia*), the variable and troublesome species of *Halimeda,* and of *Neomeris.* Almost of necessity he made studies of the other complex *Siphonales,* which are little or not at all calcified. The contributions made to our knowledge of their vegetative structure and reproduction shed much light on their taxonomic relations, both within the genera, within the families, and within the order.

The second great group of calcareous Algae, occurring in profusion on the reefs of the Bahama Islands in particular, is that of the Crustaceous Corallines, a group of the red Algae, or Rhodophyceae. In the beginning he enlisted the collaboration of M. Foslie of Trondhjem, Norway, the great authority on these plants, but while Foslie may have been largely responsible for the final determinations, it was certainly Howe who not only made the collections and selected the specimens for study, but also prepared the sections which were used as the basis for making clear their structure and relationships. Foslie and Howe

published two papers (1906) on species from Florida, Bahama Islands, and Porto Rico. These publications, besides the excellent descriptions and discussions, were provided with a most excellent series of illustrations, both of general habit and of what is almost unique in the exposition of these plants, extraordinarily effective reproductions of photomicrographs of sections. Through these illustrations of microscopic structure a new era was instituted in the more exact study of the crustaceous corallines and the more massive of the Caribbean species were the first made available for effective comparison with other tropical species.

Through these studies and others not so definitely published, Howe became interested in two phases of the relation of the crustaceous corallines to world problems; viz., the relation of the crustaceous corallines to the building up of the huge structures known as "coral reefs," and the relation between the recent living crustaceous corallines and those, now extinct, of previous geologic ages.

Concerning the first, in 1912, he published a much needed discussion of the subject in *"Science,"* on "The Building of 'Coral' Reefs," in which, reviewing the general subject, he concludes that "the importance of the corals in reef-building has been much overestimated and that the final honors in this connection may yet go to the more humble lime-secreting plants."

On the fossil crustaceous corallines, he published several papers (1918, 1919, 1922, 1925, and 1934), in which his extensive knowledge of the living forms enabled him to interpret accurately their fossil representatives. From the marine crustaceous coralline and its relation to rock building came easily an interest in fresh water forms associated with the formation of travertines. He made some studies and many examinations of both recent and fossil material. Two publications (1931, 1932) resulted and more might have been expected. An appreciative note on his assistance in solving geological problems has been published since his death by T. Wayland Vaughan (Marshall Avery Howe, Jour. Paleont., 11, no. 4: 368-370, June, 1937) with pertinent bibliography (by Rosalie Weickert).

Of the calcareous reds other than the crustaceous corallines and as occurring in the Caribbean Sea, Marshall Avery Howe made many studies, the taxonomic being recorded in his various floras, but of the species of two genera he worked out and reported some fundamental facts leading to profound changes in our attitude towards their life histories and relationships. In 1917 and 1918 he brought forward facts and experience to indicate a structural, sexual dimorphism among species of *Galaxaura*, the adult alternative generations differing sufficiently to have been classified under different subgenera. In 1920, he published a detailed paper on the "monosporangial discs" of various species of *Liagora*, a new type of structure which had barely been mentioned previously, but which Howe suggests may be integral parts of the life history of the plants on which they occur rather than independent or obligate epi-endophytes.

Much more might be said of the strictly scientific work of Marshall Avery Howe, but suffice it to say that it was done meticulously, with insight, and thoroughness. One may turn to his application to his other duties, both as an official of the New York Botanical Garden and as a citizen. As administrator, his success was sufficient to cause him finally to be appointed to the directorship. On the horticultural side, he not only cultivated ornamentals in his own garden but instituted a display of dahlias at the New York Botanical Garden which was internationally famous. A glance through the appended bibliography will indicate the more than "amateurish" interest he took in this activity. He was a charter member of the Vermont Botanical Club (1895). At Pleasantville, N. Y., where he made his home for 22 years, he performed his duties to his fellow citizens as an active member and sometime president of its "Garden Club"; and served as secretary and later as president of the Board of Trustees of the Pleasantville Free Library. He was awarded a gold medal by the American Dahlia Society, was a Vice-president of the Associated Garden Clubs of New York, and was a member of the Board of Directors of the Horticultural Society of New York.

In recognition of his scientific work, he was awarded the

honorary degree of Sc.D. by his *alma mater,* the University of Vermont, in 1919, and he was elected a member of the National Academy of Sciences in 1923. He was a Fellow of the New York Academy of Sciences, which he served as President in 1934 and 1935. He was Vice-president of the Botanical Society of America in 1913 and was elected President for the year 1937, too late to be able to serve. He was also President of the Torrey Botanical Club for the year 1936.

His home life was quiet and dignified. At home in Newfane he was very busy with chores about the farm, his earlier intervals of evening teaching for board and tuition, and his botanizing and preparation of herbarium specimens. On June 8, 1909, he married, at Stratford, Conn., Edith Morton Packard, who passed away October 18, 1928, after some years of lingering illness. Two children, Gertrude Dexter Howe and Prentiss Mellen Howe, survive their father.

Marshall Avery Howe was of the older as well as one of the present generation. He began his vocational work in early childhood. He was a real "naturalist." Yet, as he later developed, he fell into the swing of modern ideas, still attending to many subjects but doing each well. His love for Hepaticae, his devotion to the Algae, and his successful work with his dahlias, all redound to his credit and indicate his thoroughness, his precision. His calm yet full-hearted enthusiasm, coupled with persistence and skill in communicating his results to others, were his especial and most admirable characteristics.

In preparing this memoir, use has been made of the following:

Marshall Avery Howe (Jour. N. Y. Bot. Garden, 38, no. 446: 25-31, Feb. 1937) by A. B. Stout.

Marshall Avery Howe (Jour. Paleont., 11, no. 4: 368-370, June 1937) by Thomas Wayland Vaughan (with bibliography on Calcareous Algae by Rosalie Weickert).

Marshall Avery Howe, 1867-1936 (Bryologist, 40, no. 2: 33-36, Mar.-Apr. 1937, with portrait) by A. J. Grout.

Much information was gratefully received from Professor Clifton Durant Howe of the Faculty of Forestry of the Uni-

versity of Toronto, one of the four surviving brothers of Marshall Avery Howe, and from Dr. Abel J. Grout of Newfane, Vt., and Manatee, Fla., Howe's close associate and roommate in college.

For the appended bibliography, all credit is due to Howe's associate for many years at the New York Botanical Garden, Dr. John Hendley Barnhart.

BIBLIOGRAPHY *

Miscellaneous notes. Pittonia **2**: 291. September 20, 1892.

Teratological notes. Erythea **1**: 18, 19. January 2, 1893.

[Review of] Peirce's The California vine disease. Erythea **1**: 24, 25. January 2, 1893.

A month on the shores of Monterey Bay. Erythea **1**: 63-68. March 1, 1893.

Two Californian Cryptogams. Erythea **1**: 112, 113, *pl. 1.* May 1, 1893.

A fern new to California. Erythea **2**: 51, 52. March 1, 1894.

Notes on Californian Bryophytes.—I. Erythea **2**: 97-101, *pl. 1, 2.* June 1, 1894.

Chapters in the early history of hepaticology.—I. Erythea **2**: 130-135. August 1, 1894;—II. Erythea **2**: 143-147. September 1, 1894;—III. Erythea **3**: 1-6. January 2, 1895;—IV. Erythea **3**: 25-30. February 1, 1895.

Evolution of the *Hepaticae*. Erythea **2**: 172. October 1, 1894. [Review.]

[Review of] Warming's A handbook of systematic botany [English translation by Potter]. Erythea **3**: 82-84. May 1, 1895.

Notes on Californian Bryophytes.—II. Erythea **4**: 48-54. March 5, 1896.

Spermatozoids in phanerogams. Bull. Torrey Club **24**: 96, 97. February 28, 1897. [Review.]

Gyrothyra, a new genus of *Hepaticae*. Bull. Torrey Club **24**: 201-205, *pl. 302, 303.* April 24, 1897.

Notes on Californian Bryophytes.—III. Erythea **5**: 87-94, *pl. 3.* August 31, 1897.

The North American species of *Porella*. Bull. Torrey Club **24**: 512-528. November 30, 1897.

The *Anthocerotaceae* of North America. Bull. Torrey Club **25**: 1-24, *pl. 321-326.* January 25, 1898.

Porella once more. Bull. Torrey Club **25**: 96-103. February 12, 1898.

New American *Hepaticae*. Bull. Torrey Club **25**: 183-192, *pl. 336, 337.* April 12, 1898.

The *Porella* question. Rev. Bryol. **25**: 75-78. October, 1898.

The *Hepaticae* and *Anthocerotes* of California. Mem. Torrey Club **7**: 1-208, *pl. 88-122.* August 5, 1899.

The microscopical exhibit. Jour. N. Y. Bot. Gard. **1**: 168-170. November, 1900.

[Review of] Brainerd, Jones, & Eggleston's Flora of Vermont. Torreya **1**: 10-12. January 29, 1901.

Riccia Beyrichiana and *Riccia dictyospora*. Bull. Torrey Club **28**: 161-165. March 27, 1901.

The Allen collection of *Characeae*. Jour. N. Y. Bot. Gard. **2**: 52-54. April, 1901.

* By John Hendley Barnhart.

Remarks on the use of *Funaria hygrometrica* in botanical teaching. Torreya **1**: 39-41. April 19, 1901.

Contributions to the botany of the Yukon territory.—1. An enumeration of the *Hepaticae* collected by R. S. Williams 1898-1899. Bull. N. Y. Bot. Gard. **2**: 101-105, *pl. 14.* May 27, 1901.

[Review of] Jepson's Flora of Western Middle California. Torreya **1**: 69, 70. June 20, 1901.

Observations on the algal genera *Acicularia* and *Acetabulum*. Bull. Torrey Club **28**: 321-334, *pl. 24, 25.* June 19, 1901.

Botanizing in Bermuda. Plant World **4**: 101-104, *pl. 4, 5.* June, 1901.

Report of Dr. M. A. Howe, assistant curator, on a trip to Nova Scotia and Newfoundland. Jour. N. Y. Bot. Gard. **2**: 177-180. December, 1901.

Notes on American *Hepaticae*. Bull. Torrey Club **29**: 281-289. May 26, 1902.

An attempt to introduce a seaweed into the local flora. Jour. N. Y. Bot. Gard. **3**: 116-118. June, 1902.

A note on the vitality of the spores of *Marsilia*. Torreya **2**: 120-122. August 2, 1902.

The microscopical exhibit. Jour. N. Y. Bot. Gard. **3**: 161-168, *f. 24.* September, 1902.

Caloglossa Lepricurii in mountain streams. Torreya **2**: 149-152. September 30, 1902.

The microscopical exhibit at The New York Botanical Garden. Jour. Appl. Micros. and Lab. Meth. **5**: 1990-1992, *f. 1, 2.* October, 1902.

Note on the "Report of the Brown-Harvard Expedition to Nachvak, Labrador." Torreya **2**: 175. November 25, 1902.

Report of Dr. M. A. Howe, assistant curator, on a trip to Florida. Jour. N. Y. Bot. Gard. **4**: 44-49, *f. 2-5.* March, 1903.

The genus *Riella*, with descriptions of new species from North America and the Canary Islands. [With L. M. Underwood.] Bull. Torrey Club **30**: 214-224, *pl. 11, 12.* April 24, 1903.

[Review of] Grout's Mosses with hand-lens and microscope. Torreya **3**: 106, 107. July 25, 1903.

A note on the "flowering" of the lakes in the Adirondacks. Torreya **3**: 150-154. October 30, 1903.

Report on a trip to Porto Rico by Dr. M. A. Howe, assistant curator. Jour. N. Y. Bot. Gard. **4**: 171-176, *f. 18-21.* October, 1903.

[Review of] Lett's Hepatics of the British Islands. Bryologist **7**: 13, 14. January 12, 1904.

Notes on Bahaman algae. Bull. Torrey Club **31**: 93-100, *pl. 6.* February 11, 1904.

The Museum exhibit of seaweeds. Jour. N. Y. Bot. Gard. **5**: 56-63, *pl. 22* + *f. 9-12.* March, 1904.

The Pike collection of algae. Jour. N. Y. Bot. Gard. **5**: 86, 87. April, 1904.

Collections of marine algae from Florida and the Bahamas. Jour. N. Y. Bot. Gard. **5**: 164-166. August, 1904.

[Review of] Lloyd and Bigelow's The teaching of biology in the secondary school. Torreya **4**: 156-158. October 29, 1904.

Exogenous origin of antheridia in *Anthoceros*. Torreya **4**: 175-176. November 21, 1904.

Report on a trip to Europe. Jour. N. Y. Bot. Gard. **5**: 217-222, *f. 40, 41.* December, 1904.

Some of the coralline seaweeds in the Museum. Jour. N. Y. Bot. Gard. **6**: 59-64, *pl. 24, 25.* April, 1905.

Phycological studies.—I. New *Chlorophyceae* from Florida and the Bahamas. Bull. Torrey Club **32**: 241-252, *pl. 11-15.* May 27, 1905.

[Review of] Farlow's Bibliographical index of North American fungi. Torreya **5**: 200-202. November 25, 1905.

Phycological studies.—II. New *Chlorophyceae,* new *Rhodophyceae,* and miscellaneous notes. Bull. Torrey Club **32**: 563-586, *pl. 23-29.* December 6, 1905.

New American coralline algae. [With M. Foslie.] Bull. N. Y. Bot. Gard. **4**: 128-136, *pl. 80-93.* March 17, 1906.

Some photographs of the silk-cotton tree (*Ceiba pentandra*), with remarks on the early records of its occurrence in America. Torreya **6**: 217-231, *f. 1-6.* November 26, 1906. [Reprinted in] Bull. Dept. Agr. Jamaica **5**: 63-74, *f. 1-6.* 1907.

[Review of] Postelsia, the yearbook of the Minnesota Seaside Station. Torreya **6**: 250-253. December 15, 1906.

Two new coralline algae from Culebra, Porto Rico. [With M. Foslie.] Bull. Torrey Club **33**: 577-580, *pl. 23-26.* December 19, 1906.

Report on a visit to Jamaica for collecting marine algae. Jour. N. Y. Bot. Gard. **8**: 51-60, *f. 9-14.* March, 1907.

[Review of] Gardner's Cytological studies in *Cyanophyceae.* Torreya **7**: 104, 105. May 20, 1907.

Phycological studies.—III. Further notes on *Halimeda* and *Avrainvillea.* Bull. Torrey Club **34**: 491-516, *pl. 25-30.* December 17, 1907.

Lucien Marcus Underwood: a memorial tribute. Bull. Torrey Club **35**: 13-16. February 29, 1908.

[Review of] Cole's Bermuda in periodical literature. Torreya **8**: 56, 57. March 27, 1908.

Report on the botanical exploration of the Bahama and Caicos Islands. (With Percy Wilson.) Jour. N. Y. Bot. Gard. **9**: 41-50, *f. 9-12.* March, 1908.

The collections of algae. Jour. N. Y. Bot. Gard. **9**: 123-130, *pl. 46* + *f. 17-21.* July, 1908.

[Review of] Thaxter's Contribution toward a monograph of the *Laboulbeniaceae*. Torreya **9**: 6-8. January *26*, 1909.

[Review of] Recent bulletins of the State Geological and Natural History Survey of Connecticut. Torreya **9**: 35-57. February *26*, 1909.

Phycological studies.—IV. The genus *Neomeris* and notes on other *Siphonales*. Bull. Torrey Club **36**: 75-104, *pl. 1-8*. March 4, 1909.

Report on an expedition to Jamaica, Çuba, and the Florida Keys. Jour. N. Y. Bot. Gard. **10**: 115-118. May, 1909.

[Review of] Jepson's A flora of California. Torreya **10**: 16-18. January *29*, 1910.

Report on a botanical visit to the Isthmus of Panama. Jour. N. Y. Bot. Gard. **11**: 30-44, *f. 7-15*. February, 1910.

Editorial note, *in* E. I. Thompson. The morphology of *Taenioma*. Bull. Torrey Club **37**: 98. March 31, 1910.

Charles Reid Barnes. Bryologist **13**: 66, 67. May *2*, 1910.

[Review of] Greene's Landmarks of botanical history. Torreya **10**: 149-156. August 1, 1910.

[Review of] Collins' The green algae of North America. Torreya **10**: 188, 189. August **29, 1910.**

A little-known mangrove of Panama. Jour. N. Y. Bot. Gard. **12**: 61-*72*, *f. 16-23*. April, 1911.

[Review of] Gepps' The *Codiaceae* of the Siboga Expedition. Torreya **11**: 133-137. June 19, 1911.

[Review of] Some recent University of California publications. Torreya **11**: 176-180. August 14, 1911.

The plant photograph exhibit. Jour. N. Y. Bot. Gard. **12**: 218-230. October, 1911.

Phycological studies.—V. Some marine algae of Lower California, Mexico. Bull. Torrey Club **38**: 489-514, *pl. 27-34* + *f. 1*. December 1, 1911.

Reef-building and land-forming seaweeds. Proc. Acad. Nat. Sci. Philadelphia **64**: 137, 138. March, 1912. [Reprinted in] Bot. Jour. **2**: 66. August, 1912.

The building of "coral" reefs. Science II. **35**: 837-842. May 31, 1912.

[Review of] Fertilizer resources of the United States [Senate Document, No. 190]. Torreya **13**: 220-223. September *2*, 1913.

Two recent works on the marine algae. Torreya **14**: 4-8. January *27*, 1914. [Review.]

The marine algae of Peru. Science II. **39**: 254. February 13, 1914. [Abstract.]

Report on a collecting trip to Georgia and Florida. Jour. N. Y. Bot. Gard. **15**: 60-63. March, 1914.

Some midwinter algae of Long Island Sound. Torreya **14**: 97-101. June 8, 1914.

The marine algae of Peru. Mem. Torrey Club **15**: 1-185, *pl. 1-66* + *f. 1-44*. September 19, 1914.

Oxymitra (*Tessellina*) in the United States. Bryologist **17**: 72-75, *f. 1*. October 14, 1914.

Further observations on the Texan *Oxymitra* (*Tessellina*). Bryologist **17**: 92-94. November 24, 1914.

[Review of] The marine algae of the Danish West Indies. Torreya **15**: 46-50. April 15, 1915.

Ricciaceae [of Mona Island]. Ann. Missouri Bot. Gard. **2**: 50, 51. May, 1915.

[Review of] Setchell, The *Scinaia* assemblage. Torreya **15**: 134-136. July 16, 1915.

The twentieth anniversary celebration of The New York Botanical Garden. Jour. N. Y. Bot. Gard. **16**: 203-219, *pl. 163*. November 2, 1915.

Report on a visit to Porto Rico for collecting marine algae. Jour. N. Y. Bot. Gard. **16**: 219-225. November 2, 1915.

Algae [of Palmyra Island]. [With H. L. Lyon.] College of Hawaii Publ. Bull. **No. 4**: 31, 32. April 19, 1916.

Notes on species of *Halymenia*. [With F. S. Collins.] Bull. Torrey Club **43**: 169-182. May 20, 1916.

Notes on some marine algae from the vicinity of Beaufort, North Carolina. [With W. D. Hoyt.] Mem. N. Y. Bot. Gard. **6**: 105-123, *pl. 11-15*. August 31, 1916.

A note on the structural dimorphism of sexual and tetrasporic plants of *Galaxaura obtusata*. Bull. Torrey Club **43**: 621-624. January 10, 1917.

Some economic uses and possibilities of the seaweeds. Jour. N. Y. Bot. Gard. **18**: 1-15. January, 1917. [Reprinted in abridged form in] Scientific American Suppl. **83** (no. 2148): 134, 135. March 3, 1917.

[Review of] Grout's Moss flora of New York City and vicinity. Torreya **17**: 67. May 10, 1917.

Notes on North American species of *Riccia*. Bryologist **20**: 33-37, *pl. 3*. May 29, 1917.

[Review of] Fritsch's The algal ancestry of the higher plants. Torreya **17**: 123-127. July 18, 1917.

Algae. *In* N. L. Britton, Flora of Bermuda, 489-540. February 28, 1918.

The marine algae and marine spermatophytes of the Tomas Barrera Expedition to Cuba. Smithsonian Misc. Coll. **68**[11]: 1-13. April 9, 1918. [Illust.]

Algae [of the American Virgin Islands; bibliography]. Brooklyn Bot. Gard. Mem. **1**: 116, 117. July 6, 1918.

Further notes on the structural dimorphism of sexual and tetrasporic plants in the genus *Galaxaura*. Brooklyn Bot. Gard. Mem. **1**: 191-197, *pl. 3, 4* + *f. 1-4*. July 6, 1918.

Calcereous algae from Murray Island, Australia, and Cocos-Keeling Islands. Carnegie Inst. Washington Publ. **213**: 291-296, *pl. 97, f. 2; pl. 98.* August 16, 1918.

The new dahlia border. Jour. N. Y. Bot. Gard. **19**: 185-192. August, 1918.

The dahlia border. Jour. N. Y. Bot. Gard. **19**: 291, 292. November, 1918.

Dahlias and their culture. Jour. Hort. Soc. N. Y. **2**: 285-301, *pl. 45 + f. 1-3.* February, 1919. [Reprinted in abridged and modified form in] Gardeners' Chronicle (of America) **23**: 152-154. May, 1919.

On some fossil and recent *Lithothamnieae* of the Panama Canal Zone. U. S. Nat. Mus. Bull. **103**: 1-13, *pl. 1-11.* February 19, 1919.

Tertiary calcareous algae from the islands of St. Bartholomew, Antigua, and Anguilla. Carnegie Inst. Washington Publ. **291**: 9-19, *pl. 1-6.* October 17, 1919.

Observations on monosporangial discs in the genus *Liagora.* Bull. Torrey Club **47**: 1-8, *pl. 1 + f. 25-29.* February 18, 1920.

Ricciaceae. In N. L. Britton, and C. F. Millspaugh, The Bahama flora. 502, 503. June 26, 1920.

Algae. In N. L. Britton, and C. F. Millspaugh, The Bahama flora. 553-618. June 26, 1920.

The marine algae of the Bahamas. Jour. N. Y. Bot. Gard. **21**: 97, 98. May, 1920. [Abstract.]

Some plants from tropical sea gardens. Natural History **20**: 560-568. 1921. [Illust.]

A new species of *Laurencia* from Chile, described by De-Toni, Forti, and Howe: *Laurencia chilensis* sp. nov. [De-Toni, Forti, and Howe]. Nuov. Notar. **32**: 150-153, *f. 1-3.* [June] 1921. [The English part, excepting title, by Howe.]

The "working" of Long Lake. Jour. N. Y. Bot. Gard. **22**: 156-159. August, 1921.

The Collins collection of algae. Jour. N. Y. Bot. Gard. **23**: 23, 24. February, 1922.

Dahlia "Dahliadel Century." Addisonia **6**: 49, 50, *pl. 217.* March 9, 1922.

Dahlia "Ami Nonin." Addisonia **6**: 51, 52, *pl. 218.* March 9, 1922.

Dahlia "Mme. J. Coissard." Addisonia **6**: 53, 54, *pl. 219.* March 9, 1922.

Dahlia "Marguerite Clark." Addisonia **6**: 55, 56, *pl. 220.* March 9, 1922.

Dahlia "Miss Nannie B. Moor." Addisonia **6**: 57, 58, *pl. 221.* March 9, 1922.

Dahlia "King of the Autumn." Addisonia **6**: 59, 60, *pl. 222.* March 9, 1922.

Dahlia "W. W. Rawson." Addisonia **6**: 61, 62, *pl. 223.* March 9, 1922.

Dahlia "Douglas Tucker." Addisonia **6**: 63, 64, *pl. 224.* March 9, 1922.

The leaf hopper as an enemy of the dahlia. Bull. Am. Dahlia Soc. **3**: 19, 26. 1922.

Spray for dahlias. Bull. Am. Dahlia Soc. 3: 18. 1922. [Written as final part of preceding article, but dislocated and given separate title by editor.]

The Amateur's Book of the Dahlia. Bull. Gard. Club Am. No. 5 (new series) 300, 301. May, 1922. [Review of book by Mrs. Charles H. Stout.]

A new American fossil hepatic. [With Arthur Hollick.] Bull. Torrey Club **49**: 207-209, *f. 1.* August 10, 1922.

Looking over the season's dahlias. Gard. Mag. **36**: 200-202. 1922. [Illust.]

Two new *Lithothamnieae,* calcareous algae, from the Lower Miocene of Trinidad, British West Indies. Proc. U. S. Nat. Mus. **62**[7]: 1-3, *pl. 1-4.* December 22, 1922.

Order *Sphaerocarpales.* [With Caroline Coventry Haynes.] North Am. Fl. **14**: 2. January 19, 1923.

Sphaerocarpaceae. [With Caroline Coventry Haynes.] North Am. Fl. **14**: 3-6. January 19, 1923.

Riellaceae. [With Caroline Coventry Haynes.] North Am. Fl. **14**: 7, 8. January 19, 1923.

Ricciaceae. North Am. Fl. **14**: 11-27. January 19, 1923.

Dahlias and their culture. Jour. N. Y. Bot. Gard. **24**: 169-187. September, 1923. [Illust.] [Reprinted in] Flower Grower **11**: 129-131. April, 1924; 172-174. May, 1924. [Illust.]

Botany of Porto Rico and the Virgin Islands. Jour. N. Y. Bot. Gard. **24**: 188, 189. September, 1923. [Review of work by N. L. Britton and P. Wilson.]

Tropical ferns. Jour. N. Y. Bot. Gard. **25**: 37, 38. March 6, 1924. [Lecture abstract.]

Chinese marine algae. Bull. Torrey Club **51**: 133-144, *pl. 1-2.* May 17, 1924.

Starch-bearing plants. Jour. N. Y. Bot. Gard. **25**: 135-142. May, 1924. [Lecture abstract.]

Roses and their culture. Jour. N. Y. Bot. Gard. **25**: 226-228. August, 1924. [Lecture abstract.]

Notes on algae of Bermuda and the Bahamas. Bull. Torrey Club **51**: 351-359, *f. 1-14.* August 22, 1924.

Spring-flowering bulbs and how to force them for the home. Jour. N. Y. Bot. Gard. **25**: 251-253. September, 1924. [Lecture abstract.]

The 1924 dahlia collection. Jour. N. Y. Bot. Gard. **25**: 255-257. September, 1924.

Growing quality dahlias. Horticulture n. s. **3**: 502. October 1, 1924.

The 1924 dahlia season. Jour. N. Y. Bot. Gard. **25**: 317, 318, *pl. 300.* Issue for December, 1924 [January, 1925].

Hepaticae. In A. J. Grout, Mosses with a Hand-lens, 225-303. January, 1925. [3rd Ed.] [Pages 235-250, 257, 258, 269-272, written by M. A. H., and the other pages more or less revised, from Grout's text in second edition.]

Ezra Brainerd. Jour. N. Y. Bot. Gard. **26**: 12, 13. January, 1925.

Dahlias and their culture. Year Book [Fed. Gard. Clubs N. Y. State] **1925**: 13. February 17, 1925.

Dahlias and their cultivation. Year Book Mass. Hort. Soc. **1925**: 83-96. 1925.

[Review] Curtis's "A Guide to the Trees." Torreya **25**: 61. July 2, 1925.

Lithothamnium (?) *ellisianum* sp. nov. from the Jurassic Ellis formation of Montana. [With Marcus I. Goldman.] Am. Jour. Sci. V. **10**: 314-324, *f. 1-11*. October, 1925.

So-called stunt in dahlias. Bull. Am. Dahlia Soc. 6^{34}: 22. October, 1925.

The name "Dahlia." Bull. Am. Dahlia Soc. 7^{35}: 12, 13. January, 1926.

Dahlia imperialis. Addisonia **10**: 49, 50, *pl. 345*. April 8, 1926.

Reef-building and land-forming plants. Jour. N. Y. Bot. Gard. **27**: 232-234. October, 1926.

A visit from Dr. Arthur W. Hill. Jour. N. Y. Bot. Gard. **27**: 243-245. November, 1926.

The 1926 dahlia collection. Jour. N. Y. Bot. Gard. **27**: 252-254, *f. 1, 2*. November, 1926.

"How Dr. Howe does it." Bull. Am. Dahlia Soc. 7^{39}: 43-45. January, 1927.

The dahlia border at The New York Botanical Garden. Off. Bull. Dahlia Soc. New England 4^{4}: 11-14. January, 1927.

The retirement of Mr. Broomall. Off. Bull. Dahlia Soc. New England 4^{5}: 13, 14. August, 1927.

Report upon a collection of marine algae made in Hudson Bay. Report of Canadian Arctic Expedition 1913-18. **4**: Botany B. 18-30, *pl. 2*. November 24, 1927.

Annie Lorenz. Torreya **28**: 11-13. February 23, 1928.

Notes on some marine algae from Brazil and Barbados. Jour. Washington Acad. Sci. **18**: 186-194, *f. 1, 2*. April 4, 1928.

Doctor Small's coöperation with Mr. Edison. Jour. N. Y. Bot. Gard. **29**: 92, 93, *f. 4*. April, 1928.

The Mrs. A. Sherman Hoyt collection of living desert plants. Jour. N. Y. Bot. Gard. **29**: 108-111, *f. 1, 2*. May, 1928.

Ornamental plants of the sea. Jour. N. Y. Bot. Gard. **29**: 136, 137. June, 1928.

The 1928 dahlia collection. Jour. N. Y. Bot. Gard. **29**: 211, 212. August, 1928.

Joseph Edward Kirkwood. Jour. N. Y. Bot. Gard. **29**: 266, 267. October, 1928.

Edward Sandford Burgess (1855-1928). Bull. Torrey Club **55**: 433-440, *portrait.* December 4, 1928. [Reprinted in] Edward Sandford Burgess [biography] 4-10. 1932.

Horticultural and educational features of The New York Botanical Garden. Year Book Fed. Gard. Clubs N. Y. State **5**: 17, 18. 1929.

New York's first botanical garden. Jour. N. Y. Bot. Gard. **30**: 49-58, *f. 1, 2.* March, 1929.

Two new species of *Chara* from tropical America. Field Mus. Nat. Hist. Bot. **4**: 159-161, *pl. 16.* July 5, 1929.

[Remarks in symposium on plant nomenclature.] Proc. Internat. Congr. Pl. Sci. **2**: 1561-1564. 1929.

The resignation of Dr. Nathaniel Lord Britton as Director-in-Chief of The New York Botanical Garden. Jour. N. Y. Bot. Gard. **31**: 1-6, *pl. 305.* January, 1930.

Doctor Elmer Drew Merrill, the new Director-in-Chief. Jour. N. Y. Bot. Gard. **31**: 6-10. January, 1930. [Illust.]

Dahlia Maxonii. Addisonia **14**: 63, 64, *pl. 480.* February 28, 1930.

The alphabetical iris check list. Jour. N. Y. Bot. Gard. **31**: 100-101. April, 1930. [Review.]

Report of the acting Director-in-Chief [for 1930]. Bull. N. Y. Bot. Gard. **14**: 167-173. May 3, 1930.

Dahlias are plants of American origin. Arts and Decoration **33**: 64, 65, 96, 98. September, 1930. [Illust.] [Reprinted in] Bull. Am. Dahlia Soc. **12**: 4-7. January, 1931. [Illust.]

Beauty pays. [Editorial] Westchester County Times. February 20 and 27, 1931.

Notes on new or little-known marine algae from Brazil. [With W. R. Taylor.] Brittonia **1**: 7-33, *pl. 1, 2* + *f. 1-11a.* February 28, 1931.

Botanical exploration of the island of Hainan. Jour. N. Y. Bot. Gard. **32**: 45, 46. February, 1931.

A new travertine-forming organism. Science II. **73**: 508. May 8, 1931. [Abstract.]

Pruning and disbudding dahlias. Home Acres [no vol.] 6. May, 1931; [same in] Westchester Magazine [no vol.] 6. May, 1931.

Notes on the algae of Uruguay. Bull. Torrey Club **57**: 605-610, *pl. 37.* October 15, 1931.

Marine algae from the islands of Panay and Negros (Philippines) and Niuafoou (between Samoa and Fiji). Jour. Washington Acad. Sci. **22**: 167-170, *f. 1.* April 4, 1932.

Preface [to P. A. Rydberg, Flora of the prairies and plains of central North America. New York. April 14, 1932.]

Chlorotylites, a fossil green alga from Alabama. Bull. Torrey Club **59**: 219, 220, *pl. 15.* May 4, 1932.

[Review of] Newton's A hand book of the British seaweeds. Torreya **32**: 73, 74. June 10, 1932.

New York dahlias thrive in Ethiopia. Jour. N. Y. Bot. Gard. **33**: 126-129, *f. 1.* June, 1932.

The geologic importance of the lime-secreting algae, with a description of a new travertine-forming organism. U. S. Geol. Survey Prof. Paper **170**: 57-64, *pl. 19-23.* July 27, 1932.

Winter storage of dahlias. New York Gardens **1**: 81-83. October, 1932.

Plants that form reefs and islands. Sci. Monthly **36**: 549-552. June, 1933.

A blue-green alga of carbonated mineral water. Bull. Torrey Club **60**: 465-468, *pl. 24, 25.* October 2, 1933.

Arthur Hollick: February 6, 1857-March 11, 1933. Bull. Torrey Club **60**: 537-553, *portrait.* November 1, 1933.

The 1933 dahlia collection. Jour. N. Y. Bot. Gard. **34**: 250. November, 1933.

Annual report, A[merican] D[ahlia] S[ociety] nomenclature committee. Bull. Am. Dahlia Soc. **9**: 15. November, 1933.

The dahlia border at the Bronx. [The 1933 dahlia border at The New York Botanical Garden.] Bull. Am. Dahlia Soc. **9**: 27. November, 1933.

Hawaiian algae collected by Dr. Paul C. Galtsoff. Jour. Washington Acad. Sci. **24**: 32-42, *f. 1-5.* January 15, 1934.

On small dahlia classifications. Bull. Am. Dahlia Soc. **10**: 24, 25. February, 1934.

Let's settle borderline variety question by popular vote. Bull. Am. Dahlia Soc. **10**(48): 10. May, 1934.

Tree dahlias. Bull. Am. Dahlia Soc. **10**(48): 15. May, 1934.

Elizabeth Gertrude Britton. Jour. N. Y. Bot. Gard. **35**: 97-103. May, 1934. [Illust.]

Eocene marine algae (Lithothamnieae) from the Sierra Blanca limestone. Bull. Geol. Soc. Am. **45**: 507-518, *pl. 52-56.* June 30, 1934.

Elizabeth Gertrude Britton. Wild Flower **11**: 26. July 1, 1934. [Reprinted in] Desert Plant Life **6**: 35, 43. July, 1934.

Nathaniel Lord Britton. Jour. N. Y. Bot. Gard. **35**: 169-180, *portrait.* August, 1934.

A new daylily book. Torreya **34**: 97, 98. 1934. [Review of A. B. Stout's "Daylilies".]

"The Families of Flowering Plants." Garden Digest **6** (9): 41, 42. October, 1934. [Review of two-volume work by J. Hutchinson.]

Some marine algae of the Shantung Peninsula. Lingnan Sci. Jour. **13**: 667-670. *f. 1.* October 1, 1934.

The Templeton Crocker Expedition of the California Academy of Sciences, 1932. No. 17. The *Hepaticae* (chiefly *Riccia* and *Anthoceroteae*) of the Galapagos Islands and the coast and islands of Central America and Mexico. Proc. Calif. Acad. Sci. IV. **21**: 199-208, *pl. 7.* October 26, 1934.

Looking over the newer dahlias. Flower Grower **21**: 513-515, 549. December, 1934. [Illust.]

Dahlias at The New York Botanical Garden. The Dahlia: Off. Bull. Central St. Dahlia Soc. 3(2): 9, 10, 24. December, 1934.

Nathaniel Lord Britton [Minutes of Board of Managers of the New York Botanical Garden and of the Council of the New York Academy of Sciences.]. Science **81**: 87, 88. January 25, 1935.

A proposed official revision of the classification of the dahlia. Bull. Am. Dahlia Soc. 10(71): 28, 29. February, 1935.

The earliest-known illustrations of the Dahlia. Bull. Am. Dahlia Soc. 11(72): 9, 10, *f. 1-4*. May, 1935.

The 1935 season at The New York Botanical Garden. Bull. Am. Dahlia Soc. 11(74): 26. November, 1935. [Illust.]

The 1935 dahlia border. Jour. N. Y. Bot. Gard. **36**: 283-287, *f. 1, 2*. December, 1935.

The dahlia marches on. Flower Grower **23**: 139, 140, 160. March, 1936. [Illust.]

Dahlia. The Garden Dictionary, 196-198. March, 1936.

Annual report of the Director for the year 1935. Jour. N. Y. Bot. Gard. **37**: 77-89. April, 1936.

Chaplain Joseph Clemens. Jour. N. Y. Bot. Gard. **37**: 117, 118. May, 1936.

[Review of] The Garden Dictionary. Jour. N. Y. Bot. Gard. **37**: 122, 123. May, 1936.

[Review of] Tilden's The algae and their life relations. Torreya **36**: 66-68. June 30, 1936.