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WILLIAM GILSON FARLOW
PROMOTER OF PHYCOLOGICAL RESEARCH IN AMERICA
1844–1919

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It is not often that an American botanist has deeply influenced two diverse fields of his subject, but William Gilson Farlow is recognized as a dominant figure both in the study of algae and of fungi. His active career started just as the subject of Botany in this country began to be divided into specialties, and men began to concentrate their attention somewhat on a particular field, thus following the example of the Europeans. Farlow was not without the knowledge of general field botany appropriate to his day, but he both in teaching and research was a specialist in cryptogamic botany. He exercised a profound influence in this field. The algae were his first enthusiasm; he never lost his liking for them and it is the purpose of this sketch to outline the development of his prestige among phycologists, and to try to see how he influenced the study in this country. It is not proposed to attempt to give a general biographical account; that has been well done by others, particularly Setchell.

Farlow seems to have gone through his college career with some definiteness of purpose. Biographical sketches by his students and associates indicate that his scientific taste exhibited itself in the active pursuit of botany during his undergraduate days, though this was balanced by a marked skill in music. Probably there was little formal instruction available to him in his future field, although what the academic customs of the day denied the infectious enthusiasm of his teacher, Professor Asa Gray, no doubt supplied. The career of a professional botanist doubtless looked like a rather barren prospect to his parents; he with his keen mind for business affairs no doubt had a fair estimate of it. He pursued what we today would consider an essentially classical training and followed the academic term with two years at Harvard Medical School, where he did exceedingly well. Thereby he equipped himself for a remunerative profession; having, thanks to his family's comfortable circumstances, no urgent need for exercising it, he turned to his favorite science of botany and entered Gray's laboratory as his assistant.

For an insight into Farlow's earliest botanical activities we have available little material. In a day when the keeping of diaries was a common custom, he seems to have abstained, and the correspondence of his college days does not seem to have survived. As a result we have nothing before his adult scientific correspondence to tell us when he became especially interested in algae, though of later scientific correspondence there is an abundance.

We do know that when Farlow joined Gray's Cambridge group he did so not to follow in his steps as a vascular botanist, but specifically to enter the practically vacant field of American cryptogamic botanical training. The study of these plants in this country was the professional concern of almost no one. A very few scattered persons were doing specialists' work on lichens, mosses or hepatics which was excellent, but they did not generally hold positions in institutions of such prominence and facilities that their work could be very widely effective. A man in a leading university, concerning himself with the whole field, and organizing its facilities for general training in this field, was urgently needed. In many of the floras of the day a few cryptogams appeared, but in no group had studies in America begun to give for this country the knowledge equivalent to that available to Europeans. Gray saw this clearly, and he had begun to assemble materials as occasion favored. It seems that he had a small but notable collection of algae, the result in the first instance of his friendship with W. H. Harvey who had held the professorship at Dublin, and J. G. Agardh, who was professor at Lund. With this as an incentive it is not strange that Farlow's first active botanical productivity concerned the algae. While still in his apprenticeship he studied a small collection of Cuban marine algae collected by Charles Wright, and published an account of the Chlorophyceae among them in 1871. This, his earliest botanical essay, quaintly illustrated with negative line-cuts on a black ground, shows his painstaking care. He was not yet familiar with the European literature necessary to make this a critical work, but it does show skill and care. It is representative of a type of research which will appear frequently during his career, the report on materials for some exploring expedition.

Meanwhile, his major research work on marine algae was developing. Farlow had joined a group of biologists who spent the summer of 1871 at Woods Hole, Massachusetts, laying the foundation for a biological survey of the area. The United States Commissioner of Fisheries was looking toward the establishment of a research center and hatchery somewhere along the coast, and Commissioner Spencer F. Baird over several seasons examined intensively the advantages of several sites which had been suggested along the New England coast. A small laboratory was set up on the Lightship Service wharf on Little Harbor. Just what share the botanical part of this survey played in the unfolding plans of the Bureau is not clear. In Farlow's own development it confirmed his interest in the New England coast flora. Knowledge of these plants in this country, such as it was, lay with Professor D. C. Eaton of Yale University. He published very little on algae, but did have at New Haven a small collection of New England material, and some additional material from abroad secured by exchange. The friendly connection between these two students of Gray was very useful. Even at first no doubt it greatly fortified Farlow's beginning algal interests; later under pressure of his work on ferns, Eaton gave over the algal field entirely into Farlow's hands. The first fruits of Farlow's interest in New

England algae was a short note (1872) on the algae of the Atlantic Coast, indicating the general character of the flora and some of the striking species.

By now, twenty years after its appearance, the inadequacy of Harvey's *Nereis Boreali-Americana* was evident. Excellently prepared though they were, and for the times accurate, his three volumes had quite too little field work behind them. The months of his too brief visit, with considerable demands on his time apart from collecting of marine algae, were too short to obtain an idea of the algae of the long American coastlines and so he relied on the collections submitted by a few amateurs to complete his catalogue. Local botanists everywhere soon found that Harvey had inadequately presented the algal vegetation of their particular coast, and there began to appear lists aimed at amplifying the record. However, knowledge of marine algae in America was as yet too ill-advanced to permit these lists in general to be taxonomically accurate. They did signalize the general desire for a more complete account of these plants. Farlow, sharing this desire for more complete studies, brought together his observations in a list published in 1873. This is the true start toward his major algal work. Based especially on his 1871 collections at Woods Hole, but including Olney's Rhode Island algae collected in 1846–48, of which those of 1846 and 1847 had been checked by Harvey, and also 1870–71 materials from Greenport and Orient L. I., this paper also contained records which Eaton contributed of plants from New Haven and Watch Hill, and a Miss Pease from Edgartown and Vineyard Haven. This gave Farlow a very respectable list of 103 plants, with eight others considered rare or new to America. It is a matter of interest that Farlow visited and collected intensively at Woods Hole localities recognizable and productive today, over seventy years later. He made this more than a list; though not giving much of descriptive morphological data regarding the various species, he analyzed the flora in relation to other shores, recognized its peculiarities and the importance of Cape Cod as on the line dividing the northern and southern North Atlantic floras.

The publication of this paper was delayed a year and meanwhile Farlow had gone abroad on the first of his notable visits to European institutions. He went with a considerable lot of algae in hand for comparison. His chief base for the taxonomic study of marine algae in Sweden was at Lund, where C. A., succeeded by J. G. Agardh had developed resources for the study of marine algae unapproached elsewhere. Hospitably received there, he firmly established himself in the good graces of Professor Agardh, who through his life gave generous help to Farlow on every occasion. These Agardhian collections are still intact, the specimens numbered in the original sequence, the very large specimens such as *Ecklonia*, *Macrocystis* and *Durvillaea* on great cardboard sheets as Farlow saw and admired them. At Stockholm he was able to accomplish little on his first visit and went on to Uppsala. Here he enjoyed meeting both Fries, the elder at seventy-eight feeble, but assigning Farlow to his son, now the Professor, to be shown the

University. Professor Areschoug, another phycologist, lived nearby, and Farlow noted the excellence of his extensive microscopic preparations of algal structures. He also visited the tomb of Linnaeus at the cathedral, a matter of sentimental duty to all botanists. After about a year with De Bary at Strasbourg, he went to Switzerland where he collected lichens with J. Müller and, in line with his early general botanical training and his notable aesthetic sense, admired hugely the spread of colors which flowering plants developed on the alpine meadows. The developing facilities for botanical research at Geneva impressed him. He contrasted the attitude here with that in Germany where, he writes with scorn, the "Vegetationspunkt mania . . . affects many of the younger botanists to such an extent that they are quite unfitted for practical work." However, he returned to study under De Bary at Strasbourg and there developed such a respect for the morphological approach to a fundamental knowledge of algae that he nearly always insisted that his students develop research from this angle, urging that they reserve the systematics for a time when, by fuller experience, they were more thoroughly equipped. He himself here began a study of *Pteris*, particularly its apogamy, which resulted in the publication of three papers. These papers were not really very important ones in his career, nor did he return afterward to a similar topic for research, but they signalize his conversion to a particular approach in research for younger investigators.

Another most interesting algal contact which he made on this trip was that with J. B. Eduard Bornet in France. Bornet in his collaboration with Gustav Thuret was in a position of great influence in French botanical circles; scientific skill and judgment here combined with financial resources to produce elegantly scientific work of exceptional excellence, and the result was widely acclaimed. Bornet heartily welcomed Farlow and these men became close family friends as well as scientific collaborators. At Bornet's laboratory he was joined by Rostafinski and Janczewski, Polish phycologists who worked chiefly on morphology. Farlow developed the utmost regard for Bornet, and a very extensive correspondence continued throughout their lives, centering chiefly on comparison of specimens. However, the profits from this friendship with Bornet were to develop slowly; the most immediate results from this European trip was to come from his prolonged residence at Strasbourg.

This visit to biological centers in Europe lasted through two years and was followed by other trips during which he firmly established and extended the high regard in which he was held there, resulting, among other advantages, in generous contributions of valuable reference specimens, and exchanges with his herbarium. We cannot follow his tour further, but must consider the later development of his algal interests in America.

He returned from Europe to Harvard, and an appointment which from 1874 was primarily at the Bussey Institution, although he gave instruction in cryptogamic botany at the Botanical Garden in Cambridge, and in 1879 transferred to Cambridge as Professor of Cryptogamic Botany. However,

the brief contact with applied botany at the Bussey Institution induced him to attempt some studies and publication on certain disease-producing fungi, and so began a shift of interest which, though slow to absorb all his research attention, eventually did so.

During this time Farlow worked on the project of a catalogue of American marine algae foreshadowed by his first brief papers. His collections, thanks to his correspondence with Dr. C. L. Anderson and others on the west coast, as well as with all phycologists on the east coast, and his friends abroad, had grown to the extent that he felt accurately informed about these plants. Many specimens had been verified during his conference with Agardh at Lund, and others were sent to him from time to time. In 1873 he published his list of the algae of the south coast of New England, and in 1875 after his return from Europe he expanded this to a list of United States marine algae, adding especially west coast and Florida records, totalling 430 items. This was a list with a short general introduction and a few notes, a less elaborate form of the same appearing the next year under the auspices of the U. S. Fish Commissioner with the addition of notes upon economically useful seaweeds.

A small accumulation, especially of California and Florida algae, was published with a number of new species in 1877, but he never developed this general project further. Instead, he took New England records out of the 1875 list, provided a very useful general introduction, descriptions to the major categories and the species, and in 1881 published his *Marine Algae of New England and the Adjacent Coast*, the work which closed his major algal productivity. This paper well deserved its long career of usefulness; clearly presented and complete for its time, it was the uncontested reference work for its area for over fifty years. His fame as a phycologist chiefly rests on this work.

So much for the general main line of Farlow's algal evolution. What other lines of productivity did he develop? It would seem that we can group them into three classes. First in importance was the exsiccata which he founded and issued with the aid of D. C. Eaton of Yale and C. L. Anderson of California. Second was a group of papers of considerable importance locally, dealing with algal contaminants of Boston's water supplies. Third, a group of minor algal taxonomic papers. Almost all his remaining work falls into one of these three classes.

First we may deal with the *Algae Americanae Boreali Exsiccatae*. This appears in his correspondence but little before it was actually produced. Probably he talked it over with Eaton on some visit, so that little was left for written arrangement. However, Eaton (March 5, 1876) refers to a discussion of label size, perhaps for the exsiccata, and in succeeding letters references to specimens in multiple probably have the same significance, while Eaton (September 8, 1877) refers to ". . . enough for the 30 sets with a few I had already," and a week later refers to ". . . specimens too large for the small fasciculus," after which this work entered considerably

into the interchange. The Eaton correspondence was voluminous, that with Anderson less so. Anderson writes (Sept. 16, 1876) "I like your suggestion in regard to publishing an authentic set of our algae. I shall have considerable time this winter that may be devoted that way. I do not know that I have enough of our species to make a set of fifty but . . ." This seems to open up the business of western participation in the series. The fifth and final issue appeared in July, 1889. The importance of the series lies in the good quality of the specimens, the accuracy of the determinations, and particularly the fact that this first exsiccata of American algae now introduced these plants into many important collections at home and abroad, where before probably only the Harveyan and Agardhian collections had any large representation. It did very much to increase Farlow's prestige abroad. He was largely instrumental in starting the project and in the end it was practically under his full control.

The series of five papers 1876–80 dealing with algae in the reservoirs of the Boston water supply and related topics probably called for little critical research, but they were very important in discharge of Farlow's civic responsibilities. These papers at first dealt with a simple problem of unpleasant taste. Farlow found nothing clear-cut in the algal flora that could be specifically responsible. He indicated a few of the most characteristic freshwater algae present, and was able to assure the public that these algae were in no way dangerous to health. Apparently in at least one 'pond' the trouble was due to a *Spongilla*. Finally in the 1880 paper he wrote a semi-popular treatise on the general features of the algal floras of reservoirs.

Lastly one turns to what may best be described as Farlow's shorter algal works. When one inspects the list it is clear that relatively little bears upon his own collections. Farlow travelled and collected extensively on the west coast, in Florida and in Bermuda. The material went into his collections and presumably was used for exchange, but he published few of the new records which it contained. As papers covering material which he had collected himself, or which at least came from an area and a flora familiar to him, we may recognize his *Notes on New England Algae* in 1882, in 1889 *On Some New and Imperfectly Known Algae of the United States I*, and in 1899, *Three Undescribed Californian Algae.*

The prominent feature of these shorter papers is based upon his commanding position in American botany. While the era of great unspecialized natural history exploration was passing, nevertheless it had not disappeared. Parties were still going off and bringing back heterogeneous, often small, often inexpertly collected lots of material to be parceled out to various specialists for study. As always the algae were a minor part, assembled very clumsily, but they represented a cherished bit of the treasure of the often arduous journey, and they could only be entrusted to Dr. Farlow. So, because he greatly liked these plants and felt it his duty to care for these hard-won little collections, he studied them, occasionally reported new species, and published an annotated list. The geographical range covered is very great, though sometimes there were as few as a half-dozen

species included. His *Cuban Seaweeds* of 1871 was followed by reports on algae from Kerguelen Island in 1876, Cumberland Sound in 1879, Texas and northern Mexico in 1883, Alaska in 1885, Ungava Bay in 1886, South America in 1888, Peary Arctic Expedition in 1895, Azores in 1897 and the Galapagos Islands in 1902.

Farlow's last strictly algal paper appeared in 1916, a very scholarly discussion of the general character and distribution of Pacific Ocean algae, showing that his interest had persisted through the years. His last recorded paper was directly connected with algae too, as it was a biographical sketch of his friend J. B. E. Bornet, published in the same year.

One of the chief circumstances of Farlow's career and one of great potential importance for the development of his phycological interests was his share in the development of the Marine Biological Laboratory at Woods Hole in Massachusetts. The prospectus for this organization was dated 6 April 1887, and Farlow was the Trustee first named in this document. He desired to resign the following year, but letters from Minot and others urged him not to do so, and he served for some years before he severed his connection. During this period of development under the directorship of Professor C. O. Whitman of the University of Chicago, the Trustees were called upon for much financial help. Eventually some came to feel that they were losing control of the finances of the institution, that its expenditures were exceeding what the Trustees should be called upon to bear, and that the limitations which they set upon the activities of the Director were disregarded. Director Whitman clearly had a larger vision than these Trustees, a vision less trammeled by concern over details of economical operation and balanced budget. A group of the Trustees resident near Boston were particularly resentful of the attitude of Whitman and the business management of the Laboratory. Having organized and financed the institution, they felt that they should direct its administration. On the other hand, in the course of ten years the biologists who formed the Corporation, who actually came to work at the Laboratory, now felt that the institution was peculiarly their own, that they could shape, expand, and staff it as they chose, and that the Trustees who were commonly not persons working at the Laboratory during the season, should defer to the general desire of the active group.

The meetings of the Corporation and Trustees had been held in Boston in the winter and most of the Corporation members could not attend; a strong desire for greater participation of the biologists from all over the country led to a demand that meetings be held at Woods Hole during the summer. This was done in 1894, when a meeting of the Trustees was held there, but the Annual Meeting at which the major business was transacted was still held in Boston. The actively dissatisfied group of Trustees, some seven or eight out of twenty-one, engaged in an exchange of bitter letters among themselves, looking toward more effective control of the Laboratory. A special Corporation meeting was called at Boston, 16 Aug. 1897, to pass

by-laws changing the Annual Meeting to Woods Hole, and the date from January to August. This meeting was presided over by Farlow as Acting President; he tried to show that the meeting was illegally called, but failing of support, withdrew. The meeting proceeded under C. G. Kidder to make important changes in the by-laws, improving greatly the scheme of organization. However, seven of the Boston group of Trustees afterward resigned. Six of them, and one other dissatisfied Trustee, attacked the administration of the Laboratory in a very severe article in the journal *Science*, and to this Farlow was a party. The correspondence in Farlow's file shows the stages in the development of this *Science* article, the anger of the participants, and Farlow's share in keeping the text within reasonable bounds. The supporters of the Whitman administration replied in a privately printed pamphlet, subsequent to which, with the withdrawal of the chief dissidents, the whole matter quieted down.

Thus ended Farlow's direct part in what has evolved into the most ambitious project of coöperative biological organization ever attempted. It remains for us to enquire into his share in the work of the Laboratory during his trusteeship, and the persistence of his influence after he resigned. It does not appear that Farlow was ever active in instruction at the Laboratory, or that he was in any large way an investigator there. The first year there was no staff botanist; in 1889 James E. Humphrey was appointed, to be followed the next year by W. A. Setchell. Humphrey had been introduced to the algae by the Rev. J. D. King at the Martha's Vineyard Summer Institute; he studied the development of the perforations in *Agarum* for his B.S. degree thesis at Harvard, though he turned to the Saprolegniaceae for his doctorate in 1892, and eventually he deserted mycology for cytology. Setchell, another student under Farlow, was obviously an appointment favored by him. Setchell returned in 1892 and subsequently through 1895, when he departed for the west coast. Obviously Farlow, already retiring from teaching at Harvard, was content to transmit his algal enthusiasms through his students. In 1896 a greatly enlarged scheme of botanical instruction was initiated under the leadership of Professor J. M. Macfarlane of the University of Pennsylvania, who had been trained at Edinburgh, but here again Humphrey and one of Farlow's students, George T. Moore, guided the work on cryptogamic botany. This brings one to the year of the great upheaval, but in 1897 B. M. Davis, another student from Farlow's laboratory, who had gone to the University of Chicago, took control and with G. T. Moore again gave the cryptogamic work. The greatly expanded list of botanical instruction soon was restricted, but Davis remained in charge, and Moore was associated with him until 1905. During this time various other additional instructors appeared, for algae in particular J. J. Wolfe from 1902–1906, again trained by Farlow. Moore took charge of the cryptogamic botany in 1906 and carried it through 1918; associated with him until 1914 was G. R. Lyman — a Farlow student — and others, including some Harvard-trained men, but probably none who were directly trained by Farlow.

Here, then, ends the immediate influence of Farlow and his students in this venture, which has grown from a handful of investigators in 1888 with most trifling equipment, to a group averaging over 360 for the five years before the present war, and about 125 students, with extensive equipment, large permanent buildings and a considerable maintenance staff. By 1900 it had become clear that the Laboratory was not to collapse; in spite of the adverse judgment of Farlow and his friends for which there was some justification, the administration rallied scientific and financial support, and went its way. Farlow never took further active share in it; neither, however, did he dissuade his students from doing so and under their guidance its botanical work prospered for thirty years. While it is extremely doubtful that Farlow actually was diverted from algal study to any great degree by the Woods Hole dispute, it is clear that for other reasons he was willing to let others do the research on these plants. By now he had two promising protégés, his student Setchell and an amateur, F. S. Collins, who was an accountant and business man of Boston and Malden. For the rest of our analysis of Farlow's influence we may go to his list of academic students and to his friends, their records and their correspondence with him.

A formal list of Farlow's students does not seem to have been compiled. From the congratulatory volume of photographs and letters sent to him on the occasion of his seventieth anniversary we may, however, glean the names of most of those of his students who specialized in algae at least for a time.

The first man, apparently, to take a doctorate degree under Farlow was B. D. Halsted, who in 1878 submitted his successful thesis on American charophytes. This was the nearest to a taxonomic dissertation that Farlow ever permitted a student to submit. Halsted became Professor of Botany at Rutgers College where his interests changed and he mainly concerned himself with plant diseases and the breeding of crop plants.

However, perhaps an earlier student contact was that with F. W. Hooper, who took a bachelor's degree at Harvard in 1875, but his master's degree only in 1898, and did not proceed to the doctorate. There is no record of significant phycological publication on his part, but he contributed Florida algae to the *Algae Exsiccatae Americae Borealis*. His interests shifted to other fields and he became Director of the Brooklyn Institute.

The next student was a very notable one, and for Farlow his appearance was a fortunate circumstance, because into his hands Farlow consigned with confidence the teaching of cryptogamic botany when his affairs induced him to drop it in 1897. This was Roland Thaxter, who took his bachelor's degree in 1882 and his advanced degrees under Farlow six years later. Thaxter's brief excursion into the algal field included especially his paper on *Compsopogon*, a morphological study. He then turned his attention to the fungi and became a very notable figure in that field.

At this period there came under Farlow's influence Kingo Miyabe, an able Japanese botanist who had had his early training at Sapporo. He took

his doctorate at Harvard in 1889 with his phanerogamic thesis on *The Flora of the Kurile Islands*. In later years he published extensively on the marine algae, and especially the Laminariaceae, of Japan.

While Thaxter was a student, three others were pursuing algal problems with Farlow. J. E. Humphrey took a bachelor's degree in 1885 and went out to teach at Indiana University; he returned to take his doctorate in 1892 with his thesis upon the Saprolegniaceae. He introduced the study of cryptogamic botany and especially the algae at the Marine Biological Laboratory, but his interests shifted to cytology in later years. While holding a post at Johns Hopkins University and in charge of a biological party in Jamaica, he contracted yellow fever and died in 1897.

R. P. Bigelow, likewise taking a bachelor's degree at Harvard in 1887, studied and published upon the structure of the adult growing point of *Champia*. He shifted his interest to zoölogy and held a professorship at the Massachusetts Institute of Technology.

In 1887 Farlow's friend, Professor Eaton of Yale, sent a very promising new graduate to study with him. This was W. A. Setchell who, like Miyabe, continued actively in algal research to the end of his long career. These were the only students of Farlow who did so. Setchell took a master's degree in 1888 and a doctorate in 1890, going eventually to a professorship at the University of California. His publications on the marine algae of the west coast are extensive and fundamental, but he had many and varied auxiliary interests which also led to publication.

G. J. Peirce took a bachelor's degree at Harvard in 1890 and thus came under Farlow's influence, though he went to Leipsic for his doctorate. Peirce was essentially a physiologist, and eventually Professor of Botany at Stanford University. He published on the relation of *Nostoc* to *Anthoceros*, gamete extrusion in *Fucus*, irritability in algae and on brine organisms.

The next year H. M. Richards likewise graduated from Harvard; however he continued and completed the doctorate in 1895. His early algal work dealt among other matters with parasitic algae; later his interest shifted to the fungi, wound reactions and the like. He held a professorship at Barnard College.

From this time on, all of Farlow's students held a bachelor's degree from another institution, although some added the Harvard one to it. B. M. Davis came to Harvard from Stanford University. Taking the master's and doctor's degrees in 1894 and 1895, Davis went on to a detailed study of algal distribution in the Woods Hole area for the U. S. Fish Commission, which was published in 1913. Although Davis's interest in the morphological side of algal studies continued, his actual research interest changed to plant genetics. He held a professorship at the University of Michigan.

G. T. Moore came to Harvard in 1895 and repeated the bachelor's degree, taking the master's the next year and completing the doctorate in 1900. His early interests were particularly in the freshwater algae; later the burden of administration kept him from activity in the field. He be-

came Professor of Botany at Washington University and Director of the Missouri Botanical Garden.

In 1897 E. W. Olive took a master's degree, and in 1902 a doctorate at Harvard. His early interest was in Myxophyceae, particularly their difficult cytology. Later his interests shifted to mycology and he served as curator at the Brooklyn Botanic Garden before leaving academic fields.

J. J. Wolfe came to Harvard, to take his doctorate in 1904, and made a cytological study of *Nemalion* which was well considered at the time. He did not continue with algal research. He held a professorship at Trinity College, Durham, N. C.

The next student at Harvard with claims to specialization in algae was R. F. Griggs. He took his doctorate in 1911 and studied the various features of the west-coast brown algae before becoming interested more in general matters of plant distribution. He holds a professorship at George Washington University.

Finally we may mention F. K. Butters, who took a second bachelor's degree at Harvard in 1900, returning to complete his doctorate in 1917. He studied especially the genus *Liagora* and was interested in Hawaiian algae, but later concentrated his attention on ferns and phytogeography, holding a professorship at the University of Minnesota.

Reviewing this list we see that only two men continued consistently in algal research. Four, namely B. M. Davis, G. T. Moore, H. M. Richards and R. F. Griggs continued profitably with algal work for a time, and then went on to other fields. In teaching no doubt these all transmitted something of their early enthusiasm; to the teaching at Woods Hole, largely algal, Humphrey, Setchell, Davis, Wolfe, Moore and their academic descendents, all contributed.

It is hard to judge the worth to science of these men. Some were active researchers, like Thaxter and Setchell, others administrators like Moore. Of the fifteen names, eleven carried the star with their listing in *American Men of Science*, indicating a considerable recognition by their colleagues; Humphrey died before the custom was initiated, and Miyabe was a foreigner and so not included. In the voting for the first edition, Farlow himself ranked first among botanists, Whitman second among the zoölogists, exceeded only by W. K. Brooks. Seven of Farlow's students were starred in this first edition, one being in zoölogy. Almost all of his phycological students came to hold full professorships in large and well-equipped universities, many being the departmental heads. That the actual output of algal research is not great for such a number over so long a period is probably related to the specialized character of the field and the few openings favorable to specialists in marine algae. The thread of inspiration was not broken, however, but carried on into the next generation through Setchell.

The topic of Farlow's relations with other botanists is too huge to develop fully in the space remaining for this article. One may well doubt if any botanist of his generation or since has conducted as extensive a per-

sonal correspondence. Farlow knew every phycologist of note, and kept the acquaintances active. The lesser men at home and abroad constantly referred material to him for advice; he in turn sent material overseas to persons in a position to give expert help, and thereby kept up the acquaintances established during his trips abroad. Farlow never cared for either an amanuensis or a typist; he wrote his letters, one may judge from some remarks, concise ones, with his own hand and seldom kept copies. The letters reaching him he kept, thousands of them, and in his later years he had them sorted and bound into scores of volumes. A person who had grown up with knowledge of Farlow since college days would be in a much better position than the present writer to extract a connected story of Farlow's life and friends from these letters. Only half of the story is there, the other half must be surmised, for in only such rare cases as those of Gray, Bornet and Collins has the other side of the exchange been brought into the Farlow library. The earliest correspondence certainly is missing, and there is no way of telling how much has been eliminated before what Farlow thought was important was bound together.

In the first place we must recognize that the bulk of the scientific matter in these letters consists of lists of identifications and notes on various plants, discussions of nomenclature and the like. From this, little suitable to the present presentation can be extracted. Of the general material only a few glimpses can be offered, to give an idea of the nature of the problems which were referred to Farlow for advice.

The first group of correspondents are those dating from Farlow's Bussey Institute period and his first European trip. Eaton, Anderson and Wolle represent the main American contacts of these days. Professor D. C. Eaton of Yale University, also interested in the marine algae, was for many years his best and most active correspondent. The exchange opens with a letter from Eaton describing the results of dredging under Baird's direction near Eastport, Maine. He writes that the dredge had brought up *Delesseria sinuosa* and *Ptilota serrata* from at least 400 feet depth. Two years later Eaton seems to have visited Farlow at Woods Hole for a collecting trip. The trip must have been strenuous, or at least ended in a rush, for Eaton accounts for the whereabouts of his own and borrowed attire after what one suspects to have been a classical attack of professorial absent-mindedness: "Dear Dr. ——— I remembered the coat before I left Woods Hole, but too late to reclaim it. Your night shirt I have here, & will presently send it to your Boston address by the Express Co. . . . I suppose you are having a real good time of it now your students have gone." (20 August, 1875). The next year begins a very long correspondence about the exsiccata for which Eaton and Anderson shared the responsibility with Farlow, which includes their own collecting and that of Edward Palmer and F. W. Hooper in Florida. In 1879 Eaton was proposing Farlow for a position at Johns Hopkins University, as he mentions having written to this effect to Mr. Gilman. Nothing came of it. In earlier letters it is Eaton's preoccupation with ferns which calls for apology, but from 1881 it becomes evident that

Farlow's interest was shifting to the fungi. Setchell's name is mentioned first in 1885 at a time when it is evident that these correspondents were building up their bryophyte collections; two years later a discussion of Setchell's plans appears, and in June Eaton refers with pleasure to his appointment at Harvard. Apparently Eaton did not think much of organized scientific groups: in 1893 he writes to Farlow expressing disapproval of a botanical congress: ". . . I have the heartiest possible contempt for the whole crowd of priority-worshippers . . . and shall not feel the slightest obligation to conform to their 'Laws'," and regarding an embryo organization in this country ". . . the longer I think of the botanical society the worse I think." There seems to have been close social contact between the families, and Eaton's daughter kept Farlow closely informed of her father's illness and death in 1895.

Dr. C. L. Anderson was the other partner in the *Exsiccata* enterprise. He writes to Farlow in 1876 expressing enthusiasm for the prospective series, and continues with letters regarding the specimens and labels for it.

Francis Wolle, clergyman head of a Moravian girls' seminary at Bethlehem, Penna., was an indefatigable student of freshwater algae, on which he published largely, his books on freshwater algae, desmids, and diatoms having a considerable vogue fostered by the numerous, if not very precise, illustrations and descriptions. The correspondence with Farlow lasted for about ten years from 1875, mainly with regard to specimens the identity of which was in question. Apparently Farlow distrusted Wolle's determinations and for this reason sent some of his specimens to Bornet for redetermination. From a last letter of 1884 we gather that the edition of the *Desmids of the United States* was limited to 460 copies, a venture with the initial success of which Wolle was quite pleased.

The foreign correspondence beginning in this period centers on Farlow's first European trip, and continues until when toward the turn of the century, these older botanists had passed from the scene. The earliest Agardhian exchange opens when J. G. Agardh (8 January, 1872) welcomes Farlow as a new correspondent, and indicates his desire for west-coast algae, especially Laminariaceae. Later that year, correspondence arranging for Farlow to visit Lund appears and the facilities there are explained. Twenty years later Agardh again writes to Farlow at Paris inviting him to revisit Lund, and in August expresses his pleasure in the occasion after Farlow had left. There was much reference to the notable "*Algae Muellerianae*" from Australia, of which he was sending a series to Farlow. Farlow's marriage in 1900 was greeted with the friendliest expressions and a congratulatory poem.

In 1873–74 we have letters from Farlow to Thuret and Bornet arranging for his visit to Antibes. Farlow was having the traveller's perennial difficulty of fitting his plans into the vacation plans of the Europeans. The correspondence with Thuret was necessarily brief, but that with Bornet was very extensive for many years. In 1874 he wrote to Farlow encouraging him to prepare an introduction to the algae of his region, *i.e.*, New

England, and telling him the gossip regarding the Antibes group of botanists which Farlow had lately left. Of course the correspondence dealt largely with determinations of Myxophyceae. They exchanged their major as well as minor works: Bornet in 1878 writes of sending the *Etudes Phycologiques* and in 1882 of receiving four copies of Farlow's *New England Algae* and of Hervey's *Sea Mosses*. In 1883 writing in reply to an account received of Farlow's trip to Minneapolis, he indicates the part which Longfellow's *Hiawatha* and Cooper's tales bore in forming his ideas of that part of America!

Correspondence with Areschoug, Hauck and very many others of lesser note exists, but lends little to the interest of this account. That with Sir Joseph Hooker is more significant; Farlow could act as intermediary and tell him of the waning health of his friend Professor Gray. Fairly early, in 1878, replying to a request for portraits of botanists, Hooker tells what he can supply and which exsiccatae he has in duplicate for exchange. Finally, in 1907 he acknowledges formal congratulations, received on attaining his ninetieth birthday.

With the next age group the importance of the letters shifts to the American field. Farlow is by now a recognized leader, and while his contact with older Europeans flourishes, he is not particularly impelled to active correspondence with the younger group. However, we find some new names, as contact was developing, for instance, with Hariot and Lagerheim.

Among Americans, we have now the period of development of Collins as a phycologist, Farlow's encouragement of the Curtiss family in botanical collecting, and the establishment of his earlier students. Frank S. Collins was a business man employed by the Boston Rubber Company in charge of their accounting. He had little leisure, but he employed it in ardent botanizing. He was quite as much interested in freshwater algae as in marine plants; from contributing to Dame and Collins' *Middlesex Flora* and the algae of Rand and Redfield's *Flora of Mount Desert*, through many smaller papers, he developed his *Green Algae of North America*. On his *Green Algae . . .* , the *Algae of Bermuda* which he prepared with Hervey's coöperation, and on his spectacularly successful *Phycotheca Boreali-Americana*, largest exsiccata of algae ever issued, his fame chiefly rests. His work was for its day very accurate and scholarly, particularly the smaller papers in which he described the novelties he later incorporated in his larger works. For much of this Farlow provided the critical background, the reference collections and encouragement, although ultimately Collins assembled an excellent herbarium and library of his own. As it was possible to confer personally, the amount of correspondence was all the more remarkable. The letters begin in April 1881, but refer to earlier matters, discussing trips to Nahant and Woods Hole, and the plants collected. In Oct. 1894 appears a sentence, ". . . I want to distribute this species, either in the *Phykotheka Universalis* or in the set which Setchell, Holden and I have been talking of issuing, if we ever get to it; and I don't want to give a new name only to have to take it back again." There is

much interchange at about this time regarding the C. E. Pease and E. Butler collections of Jamaican algae on which Collins was to publish. The queries about labels for the *Phycotheca*, to which Farlow contributed specimens, begin to appear and Farlow writes to Collins in February 1895 acknowledging the receipt of Fascicle I, and in April Collins writes ". . . I have sent out about all the first lot I made up of Fascicles I and II, and am laying out the specimens for another batch of the same." From letters to Setchell in 1908 it seems that Farlow was trying to secure money to bring Collins to the herbarium at Harvard, but that enough was not forthcoming. As early as Oct. 1901 Collins mentions that five or six years earlier he had done a good deal of work toward a book on New England marine algae, and that he now contemplated making it cover the whole east coast; this manuscript was never modernized and completed, but went on Collins' death with his collections to the New York Botanical Garden. This interchange, too long to follow through, only ceased with the death of Farlow in 1919, Collins dying the next year.

Another useful interchange, likewise outside the academic sphere, took place about this time between Farlow and the Curtiss family, Mrs. Floretta A. Curtiss and her son, A. H. Curtiss. Mrs. Curtiss, living in Florida, issued three series of *Marine Algae of Florida* starting in 1895, with many of the determinations by J. G. Agardh. Much earlier correspondence had been exchanged between Mrs. Curtiss and Farlow regarding various Florida algae, starting in 1877. Apparently Mr. Curtiss travelled much for government agencies; he also seems to have collected natural history specimens of all sorts for sale. Mrs. Curtiss especially cared for the algae, which her son rough-dried for her in the field, and which she soaked out and mounted. In 1899 he writes of his mother's partial paralysis and her desire to have her personal collection of algae, which contained much valuable foreign material received by exchange, gotten together for the U. S. National Museum. Three months later her death is referred to, and the plans for assembling the *Algae Curtissianae* into volumes for preservation. As late as 1904 letters were exchanged, but seemingly no more algae were to be expected.

Letters between Farlow and his student J. E. Humphrey began earlier, but extend into this period. What we have from 1888 tells of Humphrey's arrival at Indiana University, the lack of a botanical library, his plans to build up the department and his hope for separate departmental status. In 1897 the letters came from Johns Hopkins University, his last post. A curious exchange here illustrates the lack of centralized authority at the Marine Biological Laboratory at the time. Humphrey had been teaching the algae course there; he was preparing for his last Jamaica trip and was asked to secure a substitute. Humphrey arranged with H. M. Richards to come, but Director Whitman without consulting Humphrey or Farlow, engaged B. M. Davis and printed the announcement. Farlow and Humphrey were indignant at having the matter taken out of their hands without warning; Humphrey died on this Jamaica trip, but both Davis and Moore served on the Woods Hole staff repeatedly. This was no doubt one

of the items which collectively induced Farlow to sever his connection with the laboratory.

Except for the Collins correspondence, that with Setchell is the most important domestic correspondence relating to American algae. The first letter is one dated December 1885. Through Eaton, Setchell had sent a specimen to Farlow for identification which proved of interest, and Setchell was forwarding more of it. Then follow a series of letters dealing with *Lemanea*, *Batrachospermum* and *Tuomeya*. There intervenes next apparently a period when Setchell was ill with rheumatism and spent some months at Sharon Springs, N. Y., and did some field botanizing about there, but with land plants rather than algae. The work at Woods Hole comes up for conference in 1891, and various persons as Davis, Brannon and Rothrock are mentioned as students who later became well known in the botanical world. A perennial topic of discussion still, the Marine Biological Laboratory "mess" is at that time reported as somewhat better than it had previously been, but Setchell complains of the high room rent: $1.00 a week each, two in a room in the Gardiner cottage! Each summer there is more about Woods Hole, and in July 1894 he mentions settling into the then new Botany building. Next June from Yale he writes to ask Farlow to recommend him for appointment to a professorship at the University of California at Berkeley; this after testing the disposition of Yale to meet the competition and getting no encouragement, he reiterates, and tells that he will receive $3000 as department head. In December he writes from Berkeley of the pleasure at the welcome he received, says he has about 500 volumes in the botanical library and tells what other funds are available to him. M. A. Howe and W. L. Jepson were there as instructors; but Setchell felt that since Howe's interests were similar to his own, that Howe should go elsewhere so that the activities of the department might be diversified; he recommended him highly to Farlow and asked help in placing him. The early issues of the *Phycotheca* came in for discussion and Setchell writes appreciatively of Farlow's review in the *American Journal*. Later in 1896, when the large expansion of the botanical lecture list at Woods Hole occurred, Setchell wrote with some amusement ". . . I understand that Macfarlane wants a botanical garden at Woods Hole &c — &c. . . ." Apparently Setchell doubted the wisdom of such ambitious plans. Setchell wrote to Farlow in some detail of his trips abroad, as to New Zealand and Europe in 1905 and again in 1911, and of the algae he collected and those he saw at the British Museum, Kew and the Linnean Society's rooms.

M. A. Howe opened correspondence from Berkeley with a question on *Fucus evanescens*, and asks help on the identification of Pacific Grove algae. He mentions his paper on California hepatics as his doctorate thesis and as a collateral interest. In 1894 he wrote inquiring of any opening at Harvard and in 1898 there were some moves toward bringing Howe to the Harvard herbarium in charge of bryophyte work. The financial terms were set forth at some length, Howe being very explicit regarding what he

felt were the conditions under which he could come. Nothing resulted, however, and other applications to Missouri and Oberlin which he mentions likewise having petered out, he wrote hopefully to Farlow regarding obtaining the headship of the department at Berkeley, which went, however, to Setchell. The latter encouraging him to move, in 1897 he writes of having taken an assistantship at Columbia University. After a break, the correspondence begins actively again from the New York Botanical Garden, and a great many inquiries regarding various plants occur, as finally those during 1919 regarding the Bahama Flora. Howe was eventually the Director of the Garden, and his work on marine algae, while less extensive than Setchell's, was at least equal in quality.

It is not possible to follow the correspondence with European botanists through this period, but one must not fail to notice the friendly interchange with Alexander Gepp as it covered the period of his marriage to Ethel S. Barton, another English phycologist, her later very precarious condition due to tuberculosis, and death. An amusing reference to the compilation of the British Museum of Natural History catalogue occurs, which Gepp describes as having been made up by J. Britten, himself, Wiltshear the attendant, with two words contributed by George Murray. In Gepp's own words (5 July, 1905) "We were the scribes, & George Murray was the Pharisee who contributed but 2 words — viz his own name."

It is impossible for a person who had no personal acquaintanceship with Farlow to write as understandingly of his witty, friendly personality as his own students. One could hardly improve on the charming biographical account by Setchell [1] to which all should refer for details of his life and the complete list of his publications.

Without question Farlow dominated algal study in America for a considerable period, and represented it before European scientists. Also unquestionably this high regard was justified; the problem is to appreciate truly how this came about. It was not due to the quantity of publication which, respecting algae, was never great and for the later years very small. Nor was it due to the importance of the material studied, for with the exception of the New England report it was never comprehensive, nor in general were many new species described. It did not derive from the sumptuousness of publication, for his best work appeared in government reports, nor the elegance of the illustrations, which when from his pen were few, stiff and labored rather than skillful. So far as his publications go they, by the care in preparation, clarity and lack of error, confirm rather than accent his reputation.

One must recognize that the high esteem in which Farlow was held was due to other factors. In the first place he was skilled in gathering together collections. He developed a personal herbarium and library of rare excellence, including items scarce and costly even at that day. His collections

[1] Setchell, W. A. 1927. William Gilson Farlow 1844–1919. Memoirs Nat. Acad. Sci. **21** (4): 1–22. Portrait and complete bibliography.

were in only secondary degree the result of his own field work. Again excepting New England, where at a few places he did get a variety of material, his collecting was not extensive and did not contribute largely to his publications. Rather by purchase and exchange did he secure from others splendid representation of the flora of many parts of the world. These treasures he was quite willing for others to consult, under strict supervision. As a result the more active descriptive phycologists, such as Collins and Setchell, came constantly to him for consultation, appreciated his careful assistance, and spread his fame. In the same way his European travels and active correspondence served abroad.

Here then we have probably the clue to Farlow's most significant contribution. He developed the first good reference collections for algal study in this country. He published skilfully, if not abundantly. He encouraged several young investigators to attempt algal problems, gave them rigorous training in meticulous research, and the two or three most productive among these he assisted in every way, so that they in turn dominated algal studies in America after Farlow's own interests were largely forced to the fungi. Professor Farlow was, then, clearly more important as a promoter, developing resources and trained men, than he was as an investigator himself, and as such he fills a distinguished place in American botanical history.

For the hospitality of the Farlow Herbarium and Library, for access to Professor Farlow's extensive correspondence, and for patient help in using these treasures, the writer is greatly indebted to the kindness of the curator, Dr. D. H. Linder.

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