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GEORGE FRANCIS ATKINSON

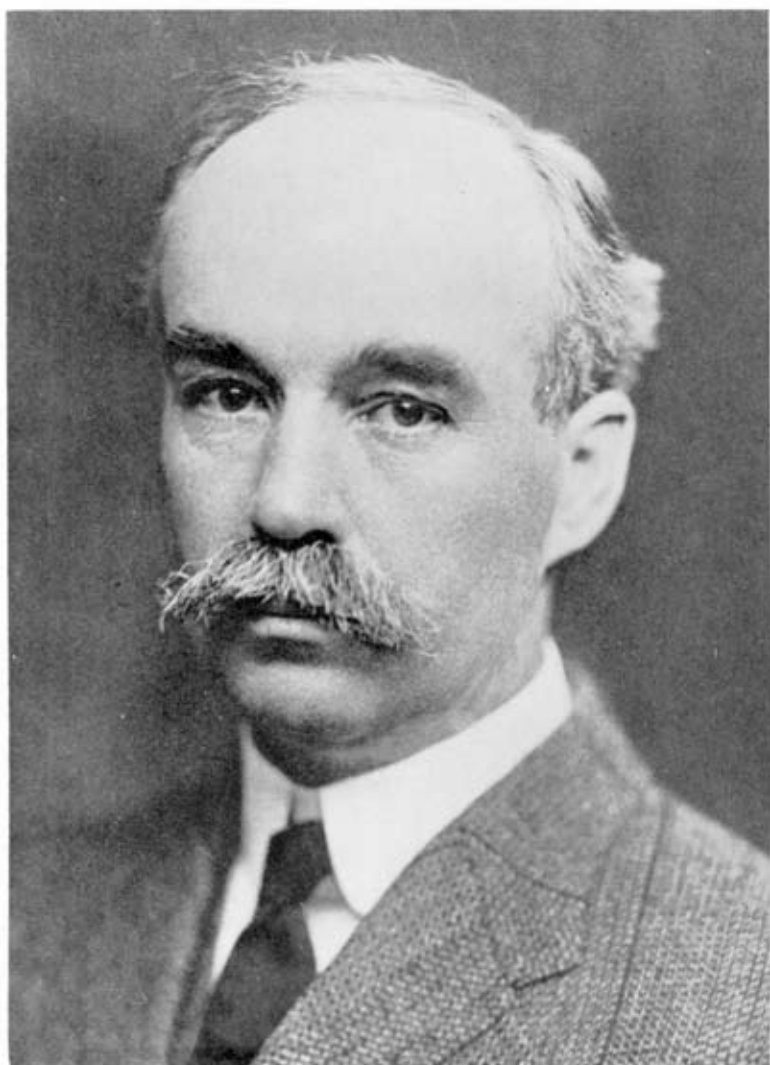
1854—1918

A Biographical Memoir by
CHARLES THOM

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Biographical Memoir

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Wm. F. Atkinson.

GEORGE FRANCIS ATKINSON

1854-1918

BY CHARLES THOM*

GEORGE FRANCIS ATKINSON was born January 26, 1854, at Raisinville,[†] Michigan. His father was Joseph Atkinson; his mother's maiden name was Josephine Fish. So much appears in *Who's Who* and other records compiled from the subject's own statements. In those published records, not a scrap of information appears about his people or himself that can be definitely attributed to the years from 1854 to 1878. By his own statement he entered the preparatory department of Olivet College in 1878 (from his letter to "the President and faculty of Cornell University applying for admission to the Junior Class as a candidate for the Bachelor of Philosophy degree for the college year 1883-4"). He received the degree in 1885.

* In attempting to write the biography of a man who has been dead more than 36 years one can not rely entirely on his own memory of individual facts and details of technical material. Published data about Professor Atkinson are inadequate. Only a few of us today actually worked with him and none kept notes at the time. The following persons have helped by loan of material and letters or personal conference: Dr. R. P. Korf, in charge of Plant Pathology Herbarium with his associates in the library; E. F. Bradford, Registrar of Cornell University; the Home Secretary of the National Academy of Sciences; the Registrar of Olivet College; Prof. Donald Reddick; Prof. A. H. Wright; Prof. J. G. Needham; Dr. Leva B. Walker; Dr. Gertrude Douglas; Prof. Charles Chupp; Dr. E. W. Sinnott; and Dr. J. N. Couch.

† No post office exists now under the name and no such village is listed on the maps seen.

He did not have many intimate friends. A few of his graduate students became close enough to be told that his boyhood offered only rudimentary country-school studies but no incentives toward nor information about higher education. He told Miss Walker that he kept in contact with one sister who later attended Olivet College and passed the inspiration on to him. Miss Douglas remembers that he spoke once of handling grain on a Mississippi River boat and again that when he finally went back to Michigan he carried money enough to pay his way and that it was his ambition to become a newspaperman.

Thus a young man, aged 24, about six feet tall, who had held his place among men where alertness and brawn were more esteemed than brains, turned his face toward a career in scholarship and earned conspicuous recognition from men who had spent their youth in the halls of learning.

Most of those who met him at Cornell knew nothing at all about his background. Those who wrote obituary notices fell back upon *Who's Who* in which he gave the data quoted in our first two lines. Miss Walker and Miss Douglas who lunched with him often (1913-1916) when his group numbered very few got a few glimpses behind the curtain. Looking over personal records the writer found a photograph taken at Enfield Gorge, August 12, 1902, that revived the memory of a vivid experience. In the picture were Drs. Durand, Van Hook, Whetzel, Kaufman, W. H. Long, and Thom—all but one of whom are gone. The following story is related as adding something to our vision of the man. His words as given below are paraphrased from memory and put in the first person.

A day or so before the incident, Professor Atkinson had announced a field trip to Enfield Gorge. He took charge of arrangements and instructed us to meet at the laboratory in Sage College. In the court back of the laboratory, we found a big carry-all, with the lunch on board, and drawn by a four-horse team. He put us all aboard, walked critically around the vehicle, then quickly swung to the high seat in front; as he hit the seat his large left hand seized

the lines and his right hand snatched the long whip and swung it over the horses, cracking it close to their backs. They jumped and went out of the courtyard on the dead run, turned right on East Avenue, then across the lower campus over Cascadilla bridge and over the pavements that lead down the 450-foot slope from the Cornell campus to the level of Cayuga Lake and the old town. He never pulled up. He went through the business section of the village at top speed. If ever a group of passengers were scared for their lives, we were. He was evidently enjoying his ride. Manifestly the horses recognized a master's hand. We arrived safely at the head of the gorge, put away our team and dispersed for the next two hours, collecting fungi.

About 12 o'clock he rounded up his party and opened the lunch. Then someone ventured to comment on his driving. He hesitated a moment, then told this tale: "I drove the stage coach in the Black Hills of Dakota, when a man was only valuable as a stage driver if he could force a maximum of speed out of a four-horse team, dodge the bullets of the highwaymen and get the thing through on time to safety. I enjoyed my ride today." Then after a little delay: "I may as well tell you the rest of it. I ran away from home when I was 13. I never entered high school. I did everything as boy and man that I could get to do. Many a time I tied the little I had on a stick over my shoulder and walked to the next town because I had no money to pay. I was headed for the Black Hills and I got there. Forget the details. I was a man grown and a voter [his words] before I realized that if I were ever to be anything but a crude laborer, I must have education. I went back to Michigan, did my secondary school work with kids, entered college—and, well, here I am." It took more words than are used here but the ideas are covered.

His later career calls for some details of his undergraduate experience. His own letter from Olivet College to Cornell gently glosses over two years in the preparatory classes and lists the usual courses in the academic college of that day up to the middle of the Junior

year. No details of the work at Olivet are now available to the registrar there.

The registrar at Cornell says that Atkinson entered in January, 1884 (he was just 30). He graduated as Bachelor of Philosophy on June 18, 1885. Wright's history of biology at Cornell records him as one of the students in Professor Comstock's first Insectary. The registrar adds that he also studied French, English literature and composition, history, botany, zoology, entomology and paleontology. He thus came in contact with a group of great teachers, Dudley and Prentice in botany, H. S. Williams in paleontology, Wilder, Comstock, and Gage in animal life. It is not surprising to one who knows about these men that Atkinson forgot his ambition to be a newspaperman and turned biologist. The only clue to his ultimate choice of botany is furnished by the registrar who reports his thesis, "Observations on the Development, Structure, and Alternate Generations of a Species of Fresh Water Alga of the Order Lemnaceae," won "honorable mention."

After graduating from Cornell in June, Atkinson was appointed Assistant Professor of Entomology and General Zoology in the University of North Carolina, at Chapel Hill. For this position Dr. Battle's *History of the University of North Carolina* records that he was strongly endorsed by President Andrew D. White and Professor Burt G. Wilder as "having attained remarkable distinction in his specialties." He covered the whole field of animal biology in his various courses. Outside his academic teaching he became a contributor of newspaper articles "for the intelligent farmer and layman" which are said to be "gems of popular writing." He "did much for the development of science at the University." He was an active member of the Elisha Mitchell Society, which represented all of science in the University and was a power among scholars, especially in the South. His resignation to go to the University of South Carolina brought a paragraph of appreciation of his usefulness and regret at his leaving from the *Raleigh News and Observer*.

During the three years at Chapel Hill his scientific articles show not a single suggestion of plant study. Five papers were published about spiders. At a recent meeting a "spider man," when asked if he knew of those papers, remembered them, but never associated them with a botanist. A forty-three page, illustrated paper on the birds of North Carolina was remembered by a distinguished ornithologist who never realized that its author was Atkinson the botanist. The publications of those three years gave little intimation that he aspired to be a botanist. In 1888 he became Professor of Botany and Zoology and Botanist to the Experiment Station in the University of South Carolina at Columbia. He published a paper upon one of the Lemnaceae which he sent to the *Botanical Gazette*. Apparently he was primarily a teacher at Columbia, S. C.

In the files at Cornell dated toward the end of the South Carolina year, we find a letter from the President of the Alabama Polytechnic Institute inviting Atkinson to accept the "Professorship of Biology in the Institute and in the Agricultural and Mechanical College of Alabama and Biologist to the Experiment Station." The three years spent at Auburn, Alabama, show a record of prodigious field activity. In addition to the teaching with perhaps one assistant, he published twenty-five papers.

Some of his surveys of the diseases of agricultural plants are published as Station Bulletins, others appear as research papers in the *Botanical Gazette*, *Torrey Bulletin*, and *Annals of Botany*. In those three years Professor Atkinson won such recognition as a botanist that when Professor Dudley left for Leland Stanford University in 1892, Cornell called Atkinson back as Assistant Professor of Cryptogamic Botany. He became Associate Professor in 1893 and Professor and Head of Department when Prentice retired in 1896. Many a guess has been hazarded as to why Cornell let such a teacher as Dudley go to Stanford, or permitted Mason B. Thomas to leave for Wabash in 1892. Someone must have judged the three and chosen Atkinson. Possibly we have given the clue above.

During the Chapel Hill period his work was in zoology and

thirteen of his publications were zoological. In the South Carolina year he made his first definite step toward botany. When he moved to Alabama, his title was Professor of Biology, but he went over to botany as will be seen by reviewing his publications. During those three years he wrote twenty papers, all but one reflecting the problems of crop-growing in Alabama and the parasitic organisms which he encountered in the State. He took with him to Cornell the type specimens of the species described during those three years. They are safely preserved by the Department of Plant Pathology at Cornell. Considering that he had a heavy load of teaching, these papers, totaling 266 pages with nine plates as well as text figures, substantiate his claim to be a botanist at that time. Again in this Alabama period, his dissatisfaction with shoddy nomenclature was made evident and pointed toward the developments of the next twenty years.

Thus briefly we have reviewed the career of a man who graduated from Cornell as Ph.B. in 1885, and after seven years of teaching and prodigious activity was called back to Cornell as Assistant Professor of Cryptogamic Botany in 1892. There is not a suggestion anywhere that he ever took a single hour of academic instruction after his graduation as Ph.B. from Cornell. It must be reemphasized that three of those years were devoted to zoology. His development to rank as a botanist eligible to Professorship at Cornell rests essentially upon the three years in Alabama.

To keep our perspective, something of the history of botany at Cornell is necessary at this point. In 1868, A. N. Prentice was made Professor of Botany which at that time included horticulture and custody of the herbarium, which had its nucleus in the Horace Mann Jr. Collection of 7,500 mounted species, including flowering plants and ferns. Prentice also had charge of planting trees and shrubs upon the campus. Thus botany at first included the whole field of plant science. In 1875 W. R. Dudley was added as Instructor (later Professor). He took over the cryptogamic field, principally the fungi for the Experiment Station in 1888. Also in 1888, the

appointment of Professor Bailey took horticulture out of Prentice's Botany Department. Thus when Prentice was dying in 1896 and Atkinson took over the department, plant science was formally represented by two departments: botany under Atkinson and horticulture with Bailey, also a distinguished botanist, in charge. Professor Rowlee handled plantings on the campus and remained in the department of botany. In 1898 forestry was definitely removed, although little real forest study had been reported. Further dismemberment followed when Dean Bailey moved the Agricultural Departments to the buildings on the East Campus centering on Roberts Hall. One by one a series of new departments were created: plant pathology, plant physiology, plant breeding and others. Finally in 1912, botany in the Agricultural College was created under Professor Wiegand and a feeble effort was made to rebuild botany as plant science. Thus Atkinson, whose professorship was in the Arts College, was ultimately left with a very small group. The stripping was done piecemeal. Plant pathology was first established under Whetzel whose ambition was supplemented by inexhaustible energy, administrative ability, and a quick mind. The line between the mycology of plant parasites and plant pathology is imaginary. The agricultural phases of botany moved fairly rapidly to the East Campus and grew enormously. The old department of botany still had courses, an instructor and two or three graduate assistants, but the work and the instructors ultimately moved to Wiegand's Department of Botany in the College of Agriculture. The name Department of Botany lingered on in the old laboratories until 1923.

Why did Atkinson remain? No recorded answer is available. One who knows something about Atkinson's mind can easily believe that he refused to accept the idea that botany should be eliminated from the cultural disciplines. About the time that all this happened Bailey himself wrote a letter to the Botanical Society of America resigning his membership because he had become a horticulturist. He later came back to the Society and as President,

in an unpublished address to the Society flatly presented sound scientific botany as the only proper foundation for a career in any one of its applied branches. Nevertheless the damage had been done at Cornell. Botany was gradually extinguished from the "Arts" College.

In Alabama, Professor Atkinson had faced a pioneering task. Agriculture in the South had just become conscious of its losses from diseases of crop plants. He was new to the State. Literature was scanty. Collections for comparison were inadequate, often incorrectly labeled. Nomenclature may be overemphasized, but access to the literature about an organism is absolutely dependent on having a correct name for it. Besides, the literature of plant parasites still reflected the idea that each organism has its own fleas that will not *bite* anything else. As a result many describers, thinking they had something unique but simple, wrote very inadequate descriptions. When one looks into Atkinson's correspondence files at Cornell he sees many guide folders with one or two letters, then a few with scores or even hundreds. Examination shows that he tried to answer each letter helpfully. He very early undertook to find out exactly, for example, what C. H. Peck, State Botanist of New York, had under his microscope as he described each fungus found in the State.

The same line of attack accounts for correspondence over many years and many hundreds of specimens exchanged with the great monographers and systematists of Europe. Every scrap of verification is attached to specimens in the herbarium at Cornell. Development of the idea over twenty years gives a value to that herbarium far beyond the number of specimens in it. It was this spirit that Atkinson brought back to Cornell—developed probably from ideas he took with him. The published results of the next ten years and the graduate work in mycology in which the botany was good and the orientation toward agriculture definite, led the writer seeking critical scholarship in mycology to select Atkinson as his leader in 1902.

In the first years at Cornell, Atkinson had continued the plant disease work much as in Alabama. After he became head of the department, his research publications shifted toward the Basidiomycetes. The pathologic routine was delegated to graduate assistants, although critically supervised.

The State of New York is a favorable collecting ground for fungi. Diversity of climate, rainfall, woods and streams, of bogs and plains had already furnished the material for a whole series of reports by the State Botanist, C. H. Peck, who had described large numbers of species as new, sometimes with inadequate material which was often in such condition that the data given were misleading. By the time Atkinson published his mushroom book in 1897 confusion between the descriptions of Peck, of the English, the French, and the group in Sweden using the works of Elias Fries was constantly evident.

About that time Atkinson standardized his own line of developing data, with the following indications:

1. His collector (graduate student, assistant, etc.) was asked when he found fresh material to bring in all of it—developing fruit bodies, fully grown fruit, old and decomposing specimens.
2. Color and color changes were to be checked against Saccardo's *Chromotaxia*.
3. An adequate range of structures must be photographed, several negatives if needed.
4. Complete descriptions were required.
5. Spores must be measured and described.
6. So also, cystidia, etc., when present.
7. Identification of the site, as complete as possible, together with the substrata.

Under such a system thousands of collections became available for study and comparison under far better conditions than had heretofore been used by those describing the species.

One day in the summer of 1903, Professor Atkinson came into

the laboratory, announced that he was going to Sweden and would come back some time in the autumn. He then assigned each project of the laboratory, with whatever such project might bring forth while he was gone, to an individual assistant in the room. By technical status, presumably Professor Rowlee was in charge, but Atkinson said nothing about it: we all knew that they rarely spoke to one another. Needless to say we raised no issues.

Atkinson went to Uppsala first, the home of Elias Fries, whose books on fungi, published throughout a very long work life, were almost law to many mycologists. Robert Fries, son of Elias and his associate for many years, was still living. Atkinson ascertained as exactly as possible the Fries' collecting ground, collected fresh material with special attention to the difficult groups, carried them to Robert Fries, who was bedridden part of the time, and undertook to find out as exactly as possible what Elias Fries had in mind when he wrote the descriptions. He had the fresh material brought in, photographed, and newly described to compare with Fries' record. In every case the specimens were brought home as reference material for the Cornell collection. The same program was repeated in the laboratory at Stockholm. Atkinson then crossed to England and repeated his program with the active group there.

Two or three years later, he visited France and repeated the practice with Boudier, Maire, and others. He spoke French well, hence was able to take full advantage of his opportunities. A diary on file at Ithaca tells the story day by day and includes striking pen pictures of the leading French scientists encountered. One note tells with glee that he wanted to photograph Metchnikoff. The assistants said "Impossible." But he asked the permission from the great man himself and got the pictures.

This part of his life has been discussed rather fully because the work that he did in building up collections of fungi, seeing that they were correctly named, fully photographed and accurately described when fresh, has been a service to mycologists, who greatly appreciate the permanent value of the changes introduced.

Along with descriptive and taxonomic work he published papers upon the structure and course of development of the fruit bodies of the fleshy fungi. In a whole series of papers on what is now called morphogenesis, he described comparative structures in considerable detail. This work was spread over several years (1910-1916), always in the intervals of his self-imposed task of describing the fleshy fungi of America.

Meanwhile the development of botanical work on the agricultural campus took most of the teaching responsibility from the old laboratory. The disintegration of the old department eventually led the University authorities to release Professor Atkinson from responsibility for formal teaching while permitting him to have special graduate students. At that time he presented a fully developed plan for several years of work on the study and classification of certain groups. The significant paragraph is inserted here:

Plan, Scope and Character of the Work

"The plan is to make the work representative of Agarics and Clavarias of North America, particularly of temperate North America. I shall include, also, my European studies on living plants, which were made for the purpose of comparing the species of the older European authors with American species. These studies of European species have been made in regions where Fries, Bulliard, Que'let and others obtained their type specimens. The determinations of plants collected in Sweden were verified by Dr. Robert Fries (son of Elias Fries) for those in the region of Uppsala, and by Romell for those in the region of Stockholm. In France many studies were made in the vicinity of Paris, in the Maritime Alps, in the Jura Mountains and in the Vosges. The determinations of these were verified by E. Boudier of Paris and by René Maire. Our Fungous flora bears a close relation to that of Europe and an interpretation of our species is greatly facilitated by a study of European species in the fresh condition."

In undertaking to carry out this plan the United States Department of Agriculture furnished an assistant and part of the expense for a collecting trip beginning in Florida and ending in the North Carolina mountains. Then Atkinson went to the Pacific coast to complete his collection of species for that area. This work started on and about Mt. Rainer with headquarters at Tacoma, Washington. Unfortunately he contracted pneumonia and died November 14, 1918. No one among his successors at Cornell attempted to complete his program, although Professor Fitzpatrick made more or less use of the material in his own way.

In spite of the large part of his time occupied by this Basidiomycete work, one needs only to look over Atkinson's bibliography to see that his obligation as a teacher was never far from his mind. His correspondence file shows groups of letters from students who had gone out in the profession and met difficulties which were referred back to the one man in whom they had faith to help.

His sole interest outside the office for years seems to have been his three-acre tract, Laurelton. Convinced that the future residence area for the University would be north of Fall Creek (Cornell Heights), he bought a selected area, surveyed it, and planned the landscaping for a pretentious home site. No one could guess how rapidly the plans could be developed or how long it would be necessary to wait for the comforts of living. Mrs. Atkinson was no pioneer. She bought a house directly across East Avenue from the laboratory, instead. The Professor continued to develop his plan, but with only a one-story building. Eventually his wife left Ithaca, and he moved into his "shack" where he resided for the rest of his life.

In Atkinson's files there is a record that Professor Fitzpatrick, no longer attached to his office, sent him a research paper of his own for review. Atkinson's reply takes up specific areas in the paper, calls attention to named research papers with places of publication in which the conclusions are different but not considered by Fitzpatrick. The next letter in the series is Fitzpatrick's acknowledgment

of the criticism and the text of the changes made to comply with the criticism. In intimate relations with him as personal assistant, this writer has seen him point out to many men the significance of whole areas of results, published in different languages, that they had overlooked.

Such incidents were not uncommon in the writer's contact with Professor Atkinson and probably account for Fitzpatrick's note, "He was the best known botanist that the institution ever produced and probably the greatest." Another commentator remarks that Fitzpatrick himself learned to think like Atkinson and was in his turn the best taxonomist upon the fleshy fungi, of the whole group who succeeded Atkinson in that field. All agree that mentally Atkinson was unique; he did not seem to forget any of the research work that passed over his table. When he went to the lecture table, he dismissed everything else—so completely that he instructed his assistant to follow him into the office at the close and tell him when the next obligation was due.

In later years he was not a popular lecturer. Some graduate students reported that the subject uppermost in his thoughts took undue prominence in a lecture course. One man said the lectures he heard were atrocious; another called them tiresome; another said that Atkinson was the best graduate lecturer he ever had; still another reported that an hour lecture ran 15 to 30 minutes over time. My own comment is: the things that he said filled my notebook; I went to Cornell for something and got it. The routine stuff was available in published books. Another person also well known, as a young man met Atkinson only at meetings. He reports that Atkinson rarely spoke formally but was usually found in the lobby or the library surrounded by young men whose problems he discussed with the background of a broad firsthand experience systematized by a remarkable mind. Such a man in those later years hardly belonged in the beginners' classroom.

As stated early in this discussion Professor Atkinson was a controversial figure. He was not a popular man in the social sense,

even though he enjoyed a wrangle at the club. Sixteen hours a day in the laboratory hardly left time for much "society." He has been dead for more than thirty-six years. Time has mellowed the comments of most of those who disliked him, but there are still such. It has allowed us all to sort over the things that we remember. The search for the present material raised this question, "What part, if any, of his contributions do botanists still consider of value, as they look back on his work?"

The mycologists agree that his publications upon fleshy fungi and his collections at Cornell are an asset of first importance in the establishment of accurate knowledge of the fungi, whether considered in relation to agriculture, to industry, or to academic biology. The "antics" of an organism, no matter how intensively portrayed, are useless unless the agent is so named as to make such portrayal accessible to any student.

The reference collection in the fungus herbarium at Cornell is then of prime importance to the student of a particular fungus, or to the monographer of a group of fungi.

Type collections are only part of the value—the specimens with nomenclature verified and with descriptions and photographs complete are a permanent record of the rigorous development of a self-imposed task.

The workers of an evolutionary turn find in his addresses scattered through thirty years and his philosophic discussions here and there, ideas that started them thinking. One man said, "I know little about his fungi, but I was forced to consider his theory whether I agreed with him or not."

One answer to the source of many books and addresses upon teaching is found in the number of botanists that came from his laboratories. In one list, Whetzel sent out a letter to thirty individual former students well placed in various sections of the plant science field, and to many more who had strayed to other fields.

The records of the National Academy of Sciences show that Professor Atkinson was elected to the Academy in April, 1918. It

is interesting to recall the membership of the botanical section of the Academy at the time, since it was the nomination by them that brought about his election. Erwin F. Smith, Chairman; Liberty Hyde Bailey, Nathaniel Lord Britton, Douglas H. Campbell, John M. Coulter, W. G. Farlow, G. L. Goodale, R. A. Harper, C. S. Sargent, Roland Thaxter, and William Trelease. Those of us who knew them all, wonder how a botanist could receive a greater compliment than nomination by this group to be their colleague.

As one who worked intimately with Atkinson for a time, I remember him as a leader who was always in his workroom, always accessible, who always cheerfully stopped his own work to help a younger man over a difficult place. Personally in sixty years in laboratories, I have dealt with many men whose names are well known, but George Francis Atkinson was as I saw him the most useful man to the graduate student of any with whom I have worked.

CHRONOLOGY

1854. Born January 26, at Raisinville, Mich. Father, Joseph Atkinson; mother, Josephine Fish.
- 1878-1880. Olivet College, Olivet, Mich. Preparatory.
- 1880-1883. Olivet College. Left January 1884.
- 1884-1885. Cornell University. Ph. B. June 18.
- 1885-1888. University of North Carolina: Assistant Professor of Entomology and General Zoology, to 1886; Associate Professor, to 1888.
1887. Married Elizabeth S. Kerr, daughter of W. C. Kerr, of Durham, N. C.
- 1888-1889. University of South Carolina. Professor of Botany and Zoology and Botanist to the Experiment Station.
- 1889-1892. Alabama Polytechnic Institute, Professor of Biology and Biologist to the Experiment Station.
- 1892-1896. Cornell University, Assistant Professor of Cryptogamic Botany, to 1893; Associate Professor, to 1896; Professor of Botany and Head of Department, 1896.
1897. Chairman of Section G. (Botany), American Association for the Advancement of Science.
1903. Mycological investigations in Sweden and England.
1905. International Botanical Congress.
1906. Mycological investigations in France.
1907. First President, Botanical Society of America.
1910. International Botanical Congress. On the Advisory Council in the North American Flora with the New York Botanical Garden.
1918. Elected to the National Academy of Sciences at April meeting.
1918. Died in hospital, Tacoma, Wash., November 14. Buried in South Haven, Mich.

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KEY TO ABBREVIATIONS

- Agr. J. Montgomery, Ala. = Agricultural Journal, Montgomery, Alabama
 Agr. Sci. = Agricultural Science
 Ala. Agr. Exp. Sta. Bull. = Alabama Agricultural Experiment Station
 Bulletin
 Am. Agr. = American Agriculturist
 Am. Florist = American Florist
 Am. Gard. = American Garden
 Am. J. Bot. = American Journal of Botany
 Am. Mo. Micr. J. = American Monthly Microscopical Journal
 Am. Nat. = American Naturalist
 Ann. Bot. = Annals of Botany
 Ann. Mo. Bot. Gard. = Annals of the Missouri Botanical Gardens
 Ann. Mycol. = Annals of Mycology
 Asa Gray Bull. = Asa Gray Bulletin
 Bot. Gaz. = Botanical Gazette
 Bull. Cornell Univ. = Bulletin of Cornell University
 Bull. Torrey Bot. Club = Bulletin of the Torrey Botanical Club
 Cornell Mag. = Cornell Magazine
 Entom. Am. = Entomologica Americana
 For. & Stream = Forest and Stream
 Gard. & For. = Garden and Forest
 J. Elisha Mitchell Soc. = Journal of the Elisha Mitchell Society
 J. Mycol. = Journal of Mycology
 Mem. Brooklyn Bot. Gard. = Memoirs of the Brooklyn Botanical Garden
 Mem. N. Y. Bot. Gard. = Memoirs of the New York Botanical Garden
 Mem. Torrey Bot. Club = Memoirs of the Torrey Botanical Club
 Mycol. Centralbl. = Mycologisches Centralblatt
 N. Y. Agr. Exp. Sta. Bull. = New York Agricultural Experiment Station
 Bulletin
 Pl. World = Plant World
 Proc. Am. Assoc. Adv. Sci. = Proceedings of the American Association
 for the Advancement of Science
 Proc. Am. Phil. Soc. = Proceedings, American Philosophical Society
 Proc. Soc. Prom. Agr. Sci. = Proceedings of the Society for the Promotion
 of Agricultural Science
 S. C. Agr. Exp. Sta. Bull. = South Carolina Agricultural Experiment
 Station Bulletin
 S. Agr. = Southern Agriculturist

Spec. Rep. Geol. Surv. La. = Special Report, Geological Survey of Louisiana

Trans. Mass. Hort. Soc. = Transactions of the Massachusetts Horticultural Society.

Woods Hole Biol. Lec. = Woods Hole Biological Lectures

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COMPILED BY

PROFESSOR HARRY M. FITZPATRICK *

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