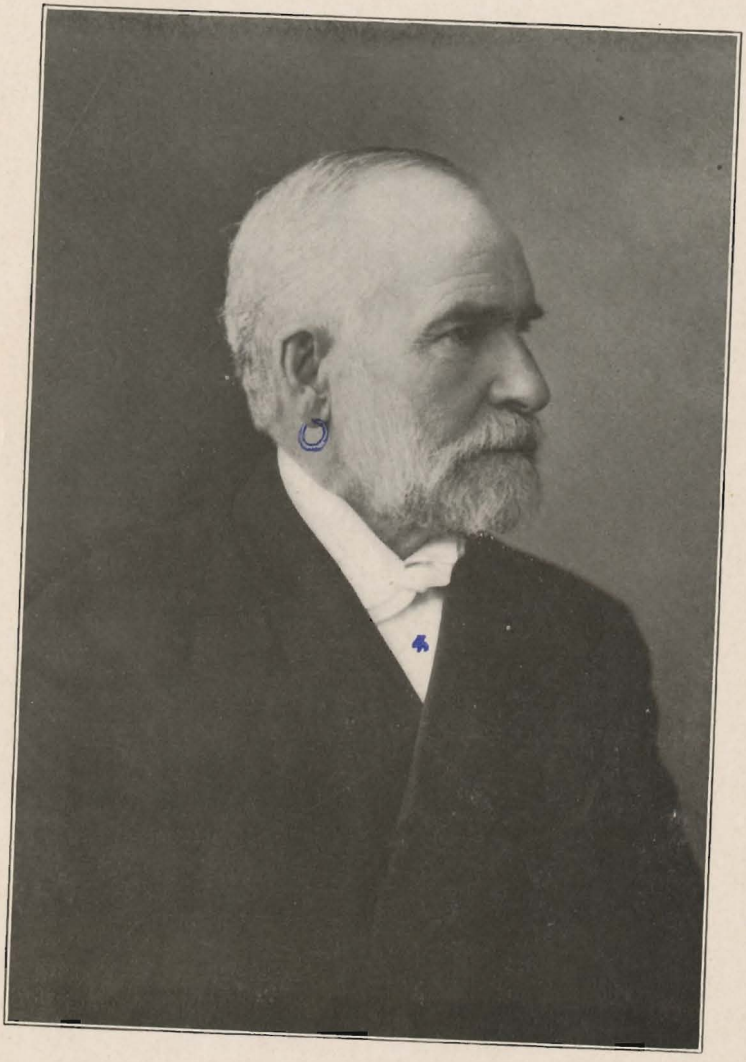

HENRY AUGUSTUS WARD

1834–1906

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BIOGRAPHIC MEMOIRS OF DECEASED FELLOWS

HENRY AUGUSTUS WARD

(Read before the Academy, December 9, 1918.)

A small pebble in the rock collection of the University of Rochester may be considered the germ of not only the University Museum but of most of the museums of America. It is a rounded fragment of hornblende gneiss crossed by series of black lines so regular as to resemble a bit of dark Scotch plaid. The description, dictated to the writer by Professor Ward, reads: "Found in a stone pile in corner of zigzag rail fence, surrounding his home, site of the Jewish temple, corner of Grove and Gibbs Street, about 1837. The first specimen I ever collected."

He evidently began his life work at an early age. He told the writer how as a lad he climbed to the platform of Corinthian Hall, just at the beginning of some exercises, to show this specimen to Chester Dewey, who waved him away, it being an unsuitable time. This incident illustrates his remarkable fearlessness in search of information and material, in striking contrast to his singular modesty and timidity in personal relations.

Ward was born March 9, 1834, and died by automobile accident in Buffalo, July 4, 1906. The biographical facts concerning him and his family may be found in editions of "Who's Who in America" previous to 1907.

The life and work of this remarkable man has been so felicitously told by one of his former assistants, William T. Hornaday, that extended extracts from his writing will form the larger part of this memoir.

THE KING OF MUSEUM BUILDERS

(By W. T. Hornaday in The Commercial Travellers Home Magazine of February, 1896.)

"The king of museum-builders is an American; and the greatest scientific emporium in the world is at beautiful Rochester, fairly in the shadow of her University. As patriotic Americans we have good reason to be proud of

Professor Ward and his work, and there are some millions of us who should also think of him with feelings of gratitude. In my opinion he has done more toward the creation and expansion of the scientific museums of the world than any other twenty men I could name, and the value of his work as a scientific educator can never be estimated in dollars and cents.

I knew him well; and having quarreled with him frequently in the ardent and aggressive days of my youth, I feel that I can now judge dispassionately both his character and his work, and write his story exactly as it is.

It is said by some that familiarity breeds contempt, and that no man is a hero to his valet. It may be so, especially when the party of the second part is a fool; but, at all events, after seven years of service with him, after months of his society as a travelling companion, and twelve years more of personal correspondence, I still can say that Henry A. Ward is the most remarkable scientific genius I ever knew. . . .

In this country, in England, Germany and France there are other men who make a business of gathering and distributing scientific specimens for museums; but this man towers above them all like a colossus standing on a plain. Where other men are able to supply the specimens for one small department of a new scientific museum, his vast establishment can fill the entire museum, from the lowest depths of geology up to man himself, with every department reasonably complete. The whole of the Lewis Brooks Museum, of the University of Virginia, except the building, was taken bodily and at once out of the Rochester establishment, and scarcely made a hole in it. When Marshall Field, of Chicago, gave his check for $100,000 in exchange for the entire Ward Collection at the World's Fair, a whole museum was bought and 'located' in one day.

In these days, the times require that every man shall have his special work, bounded, limited and confined. In science no man now dares to attempt to know it all. He must specialize within the fence that bounds his particular bailiwick. . . .

Know that Professor Ward belongs to neither of these classes of naturalists. With a fine scientific education, the inborn habit of investigation, and a command of language—or I had better say languages—of which any teacher might well be proud, he elected to carve out for himself a special niche in the world and fill it all alone.

. . . His life work began in carrying an old trunk filled with fossils from the Paris Basin, across the English Channel, and selling its contents to the London museums for a good round sum. Now, however, it requires twenty-one freight cars, jammed to the roof, to transport such a collection as that which constituted the 'Ward Exhibit' at the World's Fair of glorious memory.

. . . I have before me a list, closely printed, exactly the length of my arm, of one hundred American museums, to each of which Professor Ward has supplied collections. It is a roll of honor well worthy of being carved, figures and all, on his monument. In reality it is a complete list of all the scientific museums in the United States worthy of being mentioned any-

where. The cost of the natural history collections purchased of Ward's Natural Science Establishment by this group of museums alone foots up a grand total of $730,223. . . . There are only a few civilized, educated countries on the globe to which the Ward establishment has not sent natural history collections. . . . In 1879, when wandering through Tokio, Japan, an utter stranger in a strange land, I visited the Educational Museum; and there, in a large collection 'from Ward,' I beheld with the joy of an old acquaintance the stuffed and mounted figure of the very puma that I shot on the Essequibo River, South America, in 1876."

Hornaday's very happy description of the gathering of scientific material from all parts of the globe, and the great work of the Ward establishment, is here omitted.

"Professor Ward's history and personality are as strange as his profession. The next time you are traveling by rail—not in the smoking car, however, for he never uses tobacco—and see a studious, preoccupied man with a closely trimmed gray beard, rather scanty gray hair, keen, piercing gray eyes, old-fashioned gold spectacles, a big leather satchel, and a seat full of letters, pamphlets and books, it will surely be Henry A. Ward, A. M., F. G. S., etc.

His height is five feet eight, and at present his weight is 172 pounds. If one could examine him analytically it would be found that internally he is composed of raw-hide, whale-bone and asbestos; for surely no ordinary human materials could for forty-five years so successfully withstand bad cooks, bad food and bad drinks that have necessarily been encountered by any one who has, so recklessly of self, traveled all over creation.

. . . At ten years of age master Henry failed to harmonize with his parental environment. Having provided himself with a little brass pistol, at a total cost of seventy-five cents, he ran away from home, boldly struck out for Chicago and after long weeks of walking and riding actually reached his goal. It was his plan to build for himself a wickiup on the edge of the prairie near the city, shoot prairie chickens, and sell them in open market for cash. During his first day's experience on the Chicago prairie he encountered a good Samaritan, who chanced to be the gentleman after whom Clark Street was subsequently named. Mr. Clark kindly extracted the lad's story, took the embryo market hunter to his own home 'and grossly betrayed my confidence,' said Professor Ward, 'by writing to my uncle Moses, who sent one of his clerks after me, who ignominously took me back to Rochester.. . . .'

I doubt if any boy ever wrestled harder with circumstances to win an education than did young Ward during the two and a half years he spent at the Middlebury Academy at Wyoming, N. Y. By virtue of his official position (as janitor), he lived in the top of the Academy building, and supported himself by doing more kinds of work than many a boy of to-day has even

seen done. As opportunity offered, he did carpentry, shoemaking, gardening, painting, and livery stable work. One of his specialties was cleaning out wells. In September, 1848, while the late well-known agricultural publisher, Orange Judd, tramped the road between Warsaw and LeRoy repairing clocks, Ward and his partner went over the same route, cleaning out wells on a very profitable basis.

After the Academy he went to Williams College . . . where he was a fellow student of Senator Ingalls and Hon. Charles E. Fitch. There, also, he supported himself by hard work in hours filched from periods that should have been devoted to study and recreation. His best friend was Professor Emmons, the geologist, who showed him the path that afterwards led to geology and mineralogy, and started him therein."

It would be interesting to know why young Ward went to Williams instead of studying at his home college, which had opened in 1850, a year before he entered Williams. It is believed that his interest in earth science was awakened by Professor Chester Dewey; and it may be that he went to Williams on account of Professor Emmons.

"In speaking of that period of his life, Professor Ward admits that he was a bad student in all his studies except geology, mineralogy and the languages, in which he always stood high. . . .

In 1853 Professor Louis Agassiz came to Pittsfield, Mass., 28 miles from Williamstown, to deliver a lecture. The college boys hired a band wagon and drove over. The fare was seventy-five cents, and being without money, young Ward walked the 28 miles to the lecture. . . .

After the lecture Ward was introduced to Professor Agassiz, and invited to visit him at his hotel. The direct result of the fifty-six mile walk to hear one lecture was that the walker went at once to Cambridge, and became a pupil of the great Swiss naturalist. . . .

At Cambridge young Ward and 'Charlie' Wadsworth became such fast friends that General Wadsworth took the two boys to Paris with him, gave Ward a year's course of special instruction in the School of Mines, and to crown all, afterward gave the lucky boys a glorious trip to Egypt, up the Nile to the third cataract, winding up with Suez. Thus began the long series of delightful journeys over the face of the earth so dear to the heart of Henry A. Ward, from which he will never rest permanently so long as he can climb the steps of a car, or cross a gangplank without falling off.

After the close of the great Egyptian picnic young Ward resumed his studies in Paris. The only regular feature about his course was running out of money. He would study in the School of Mines until almost penniless, when he would drop his books and hasten to the gypsum and chalk quarries of Montmarte and Meudon. There he would gather a good load of minerals and fossils, pack them in his trunk, cross the channel to Lon-

don, and sell them to the British Museum, the School of Mines, or wherever a buyer could be found.

He was not long in finding out that British fossils and minerals were also salable in Paris, and forthwith he tapped the mining regions of Cornwall and Cumberland. Often he returned to Paris with quite a large sum of money in his pocket, sometimes amounting, he slyly says, to as much as $40. . . .

At Epernay, sixty miles east of Paris, good Madame Cliquot had a large vineyard which produced the very fine brand of champagne, bearing her name. Certain strata of the Paris Basin, of the oldest Eocene age, cropped out with very fine sections on the estate of Madame Cliquot, and brought to light certain fossils that were then little known, and valuable. If Professor Ward ever sets up a new coat of arms for his posterity, surely it should contain somewhere the figure of a long, trumpet-shaped shell of the genus Cerithium, on a carpet-bag, couchant.

Thanks to the conciliating diplomacy that every collector must possess to be successful, and to the good nature of Madame and her manager, the young American who spoke such excellent French was given a cinch on the fossils underlying a portion of that estate, and told to work his will. He hired workmen at forty cents a day, and for several summers he mined and countermined his concession so successfully that many score of those curious fossils now repose in British and continental museums, each having yielded a benefit to the purveyor of from $5 to $10. Nature kindly made them just small enough to pack successfully in a trunk, and also light enough to carry in a satchel when necessary.

Notwithstanding the noise it makes, Europe is a small country; and in a very short time Ward had extended his field of commercial activity over the whole of it. 'I never traveled third class when I could go fourth,' said the man of many trips, 'but I went all over Europe, selling specimens to museums, and collecting to sell elsewhere. I went to Brussels, Hamburg, Copenhagen, Berlin and Vienna repeatedly, and finally covered Sweden, Russia and Spain. . . .'

Thus was developed the germ of Ward's Natural Science Establishment. The history of that strange and unique institution really dates back to the Paris Basin and the Cerithium quarry in the vineyard of Madame Cliquot. The making of the great Ward cabinet of minerals, and its purchase for $20,000 by means of a popular subscription for the University of Rochester, is merely an important incident in the development of the idea.* A still

* At the time the Ward Collections came into the possession of the University of Rochester, and were displayed on the top floor of Anderson Hall, occupying ten rooms, a pamphlet of 44 pages was printed describing the collections. In this Professor Ward says, that after collecting from American localities he had "spent six years in Europe, studying in the large museums, and travelling very widely through that continent and into Asia and Africa, in executing the detail of a plan which he had formed for a large Mineralogical and Geological Museum. . . . I have collected them, almost from the first, upon a plan which was strictly an educational one, and which contemplated a full and equal illustration of these sciences. . . ."

more moving cause was the appointment of young Mr. Ward, after five years study and work abroad, to the professorship of mineralogy, geology and zoölogy in the University of Rochester. It was during his work as a teacher that he found how seriously every American teacher of science was hampered and handicapped by the lack of tangible representatives of the beasts, birds and reptiles that abounded in geologic times, and are now extinct. Therefore, for several years in succession, he spent his vacations in the royal museums of Europe, making plaster-of-paris moulds of their rarer and more striking fossils, from which he was afterwards enabled to make perfect plaster copies of the originals for his beloved cabinet in the University of Rochester.

The outcome might easily have been foreseen by a blind man. No sooner were those wonderful casts brought forward than other institutions of learning sought copies from the same mould and 'Ward's Casts of Celebrated Fossils' was the final result. American teachers and students, to whom the originals were inaccessible, were delighted with them. Illustrated catalogues were issued, the largest of which we used in my *alma mater* as a textbook. The casts became exceedingly popular, and were an important factor in the final upbuilding of what is now the Ward Establishment. . . . in 1869 he gave up his professorship in the University of Rochester.* Embowered in the stately elms and spreading maples that overarch College Avenue, almost in the shadow of the main building of the University, there now stands a group of sixteen buildings of about twelve different sizes, each with a gilded totem at its peak to show the place in nature of its contents. Over the wide gateway to the courtyard . . . the lower jaws of an immense right whale form a gothic arch. As you enter, a conspicuous placard informs you in the most business-like way 'This is not a museum but a working establishment, where all are very busy.' . . .

His ambition was fully realized at 27 years of age. The collections were placed on exhibition in a large hall at the corner of Main Street and Plymouth Avenue; and attracted wide attention. The descriptive pamphlet quotes Dr. James Hall, Dr. John Torrey and Professors Dana, Silliman, Edward Hitchcock, Doremus, James Orton and others, to the effect that the collection as a whole was the finest and most complete in America, if not in the world. But it was beyond the appreciated needs of the institutions of that day, and was a "white elephant." Then President Anderson and the friends of Ward decided that it must remain in Rochester, and a fund of $20,000 was raised by subscription, headed by Lewis Brooks for $5,000, Levi A. Ward for $1,500, and Freeman Clarke and William A. Reynolds for $1,000 each. This list, along with the bill of sale and a brief description of the collection in Ward's own writing, is preserved.

The price paid was little more than the amount of Ward's debt to his uncle, Levi A. Ward, who had generously financed him.

The Ward's Natural Science Establishment was subsequent to, and an outgrowth of, the making of the University collections. H. L. F.

* The instinct of the collector and the desire for travel was so compelling that Ward could not be held to the routine work of the college instructor, and he was not active in the college after about 1865; but his name was carried as "Professor" in the University Catalogue until 1875. In 1896 the University gave him the degree LL. D.

The University Museum contains many of the smaller fossils which were the "originals" in the series of casts.

Adjoining all these buildings on the north is a spacious and well-lighted square house, in the upper right hand corner of which is 'the study,'—dear to the memory of I cannot tell how many naturalists, both young and old. In the front right hand corner of the big study which is walled with books, barricaded with maps and eternally littered with scientific papers and pamphlets and photographs and drawings and small specimens, there sits the presiding genius of this unique world. No man is more busy than he, yet Abraham Lincoln himself was not more approachable, nor more kind toward everyone desiring to see him.

Twenty-one years ago, when I was . . . a college student, no sooner did I hear of this strange man than I fired a letter at him, modestly stating that I would like to have him teach me everything I most desired to know. When Professor Bessey read his kind, and even fatherly reply, he remarked with vigor, 'Well, that man is no churl, that's plain.' And truly he was not, as many an American naturalist can testify."

Here follows a list of eminent men in the scientific world, with their positions and work, who were started in the Ward establishment. Hornaday names G. K. Gilbert, James Orton, Frederic A. Lucas, Walter B. Barrows, E. W. Staebner, Edwin E. Howell, Charles H. Townsend, J. W. Schollick, and the two sons, Charles H. Ward and Henry L. Ward.

Other names that now should be given are: William M. Wheeler, Frank C. Baker, R. H. Pettit, Carl Akeley, Henry L. Preston, George H. Chadwick, A. B. Baker, and Charles Bull.

"Scores of other men have been trained here in various branches of scientific work, and have gone forth to fill positions of responsibility. The Society of American Taxidermists, which in five years' time wrought a complete revolution in taxidermic work in America, was founded here in 1880 by Professor Ward's taxidermists, and in all its work always received from him hearty sympathy as well as active support and co-operation. It is my firm conviction that no man living has done as much toward the promotion of the art of taxidermy as has been done by Henry A. Ward and the influences created by him. . . .

Of all the travellers I have ever known, aye, or ever heard of, Professor Ward is the most persistent, and I may still say, unsatisfied. . . . I, too, love to travel; but it makes me feel both tired and homesick to think of all the trips abroad he has taken. There is hardly a nook or corner in the United States that he has not been to or through, and the same is true of Europe. Egypt, Nubia, Arabia and Somaliland are merely nice winter playgrounds for him, and Zanzibar, Abyssinia, Mozambique, Zululand, Natal, Cape Colony and Griqualand, 800 miles in the interior of South Africa, have all been ransacked by him for specimens. So also with Japan, Australia, Patagonia and Brazil."

During the ten years of active life after Dr. Hornaday wrote this appreciation, Ward made many long and arduous journeys. In 1903 he searched every country in Europe except Turkey and Scandinavia for meteorites. In a trip to Persia he faced the Shah, and induced him to cut off a piece of the Viramin siderite. Only a few weeks before his death he made a trip to South America and secured a large piece, 324 pounds, of the famous meteorite which stood on a marble column in the plaza of Santa Rosa, Colombia. The quest for meteorites for the great Ward-Coonley Collection had started another series of world trips.

"When still a beardless young man he went up the river Niger, in time to tell David Livingstone all about that country, in Sir Roderick Murchison's London drawing room. On the African Island of Fernando Po he was put down on the sand to die comfortably of African fever, but was rescued and nursed back to life by a negro woman. . . .

Thousands of people there are, also, who know Professor Ward only by correspondence, all written by his own hand, and the cords of letters he has written since I first knew him remind me of his handwriting. It is peculiar, and once seen is never forgotten. It is so heavy, so run together and so peculiar that it caused one of his western correspondents to protest as follows: 'If you should ever try to get up a writing school in this vicinity, I will do all I can against you. Why will you persist in writing with a sharp stick, when pens are so cheap?' . . .

Naturally one is curious to know the religious belief of this strange cosmopolitan, who has hobnobbed with American puritans, French infidels, Mohammedan Arabs, Chinese Buddhists, and goodness only knows what else. While going down the Red Sea with him bound for the great hot-bed of Mohammedan fanaticism, Jedda, I put the question.

'I am an agnostic,' was the answer; 'but I would like to be called a Christian agnostic. I would like to be spoken of as one possessing the high hopes and ideals of Christianity, except that mine are based on data entirely distinct from those on which Christians base theirs. . . .'

I have often wondered how Professor Ward will start on his last journey; whether it will be by accident, or sudden and violent illness in some foreign hotel or steamer. . . . One thing only about this causes him great concern. He is really haunted by a fear that he may chance to die so far from Buffalo that he cannot be scientifically and esthetically cremated, and will be compelled to undergo the ignominy of interment and slow decomposition in mother earth! . . ."

Singularly, his death occurred in Buffalo; but it seems a pity that after escaping all the dangers of foreign travel for more than

half a century he should perish by street accident at home. If a meteorite from the celestial spaces had struck him it would have been fitting. His remains were cremated, as he wished, and rest in an urn in a niche of the great glacial bowlder of jasper conglomerate which he had brought from Algoma district, Canada, and placed in Mount Hope.

". . . In speaking of the advance made by American institutions in natural science equipments, Dr. Goode says: 'In this connection should be mentioned the very important influence of Professor Henry A. Ward, who in the conduct of the Natural History Establishment at Rochester, was always evidently actuated quite as much by a love for natural history and the ambition to supply good material to museums, as by hope of profit, which was always by him subordinated to higher ideals in a manner not very usual to commercial establishments."

A GREAT MUSEUM BUILDER

(By W. T. Hornaday, in The Nation, July 12, 1906.)

"Henry Augustus Ward, . . . to whom the scientific museums of America owe more than to any other man, was killed by an automobile at Buffalo, July 4. The world has its professors of zoölogy, its doctors of science and its curators, but it has only one maker of museums in the class of this remarkable man. He was a unique personage, and, viewed to-day in the perspective which a third of a century can give, his genius and his works bulk large.

In the ordinary sense Professor Ward was neither a scientific investigator nor a college professor. In these lines he did not aspire to distinction; but his formal title he acquired properly during the five-year period when he was a member of the faculty of Rochester University, and there taught the natural sciences. His life was devoted to culling scientifically and accumulating the choicest objects for illustration of the processes of nature; to converting them into museum specimens, and finally to building museums. With him the idea of educating the masses in the natural sciences by means of object-lessons became an absorbing passion. He cared for money only to spend it in wider travel and more collections. And while he found purchasers for great collections as no other man ever did, the huge checks which he received he always joyously scattered to the ends of the earth in the purchase of more 'museum material.' . . .

Professor Ward's most notable achievement as a scientist and educator was, in my estimation, the colossal task which culminated in the Ward Collection of Casts of Celebrated Fossils. . . . Poor indeed is the college or university museum which does not contain a series of 'Ward Casts.' About two hundred sets of them have, I think, found lodgment in the museums and higher institutions of learning in this country. The most

noteworthy objects are the great Megatherium, the Dinotherium, Glyptodon, Colossochelys, Mastodon, and Elephas ganesa. . . .

Henry A. Ward was the first American to take up the making of museums in a systematic and scientific manner. The collection which he finished about 1862 and placed for the citizens of Rochester in the museum of the University of Rochester, may justly be regarded as having set the pace. Even after the lapse of [44] years it is a good object lesson to aspiring museum builders, a collection to study and admire. . . . As early as 1873 when the best of our scientific museums were in their swaddling clothes, and skilled museum preparators were a negligible quantity, Professor Ward assembled at Rochester a corps of the best French, German, and American taxidermists, osteologists, moulders, and modellers, that high wages could procure. In 1876 I was astonished at finding that Rochester afforded better facilities for the study of museum making than Paris, London or Berlin.

About eight years ago Professor Ward . . . relinquished the detailed management of the Rochester establishment. After that he devoted much time to completing his collection of meteorites, which for nearly twenty years has been a favorite interest. He brought it to a remarkable state of perfection (the largest in the world). His last literary work was the publication of an elaborate annotated catalogue of the collection; a model of its kind."

Ward wrote little for scientific journals until late in life, but the many illustrated catalogues of the Establishment were witness to his scientific knowledge. The Catalogue of Casts was probably the best general work on Paleontology of its time in America. Two very interesting articles were printed in the Democrat & Chronicle of November 17, 24, 1889, written at Punta Arena, Patagonia, relating his experiences in an extensive trip in South America.

In the last years of his life he published many interesting descriptions of new meteorites. Seven articles were in the American Journal of Science; one in volume 49 (1895), one in vol. 5 (1898), two in vol. 15 (1903), and one each in vol. 17 (1904) vol. 19 (1905) and vol. 23 (1907). The Mineral Collector for September, 1904, contained an interesting article by him on the values of meteorites. His best meteorite articles were published in the Proceedings of this society; one in volume 2, and seven in volume 4, with 23 full-page plates. Two of these papers were the first descriptions, with photographic illustrations, of two of the most remarkable meteorites ever found. One is the Bacubirito iron, in Sinaloa, Mexico; the other, the Willamette, from Oregon. The

Willamette has the most remarkable form among meteorites, and the two are exceeded in size only by the Anighito iron brought by Peary from Cape York, Greenland. The latter and the Willamette are now in the American Museum of Natural History.

Professor Ward was a Councillor of the Academy in 1892. When in the city he was usually present at Academy meetings, and the Proceedings record many addresses and exhibitions of material, always to the great pleasure of his audience. He was a charming raconteur. Some of his living associates tell with gusto how the programs of meetings were ignored when Ward was induced to talk. Yet he was modest, even timid, and the request for an address or paper would cause dismay. It is very unfortunate that he was not induced to dictate his memoirs. The story of his wanderings, told by himself, would have made the most readable book of travel.

"At the age of seventy Professor Ward went to Canada, and selected a particularly fine rock 'specimen' to mark his last resting place. A massive and shapely bowlder of jasper conglomerate was brought to Rochester, erected on a prominent knoll in Mount Hope Cemetery, and his name was sculptured upon its face. Except for the chiseled inscription the rock is as it came from nature's workshop. This last task of the always-forehanded man of science was not completed a day too soon. Thus passes from life a man whose services to science, and also to unscientific millions, were great, but understood and appreciated by those only who knew him best and longest.

. . . From 1870 to 1895 he was the man for the hour, the birth hour of many new museums, the renaissance of old ones. He wrought with high purpose; he lived to see the fruits of his genius and his labors; and in his peculiar field he leaves no understudy."

H. L. FAIRCHILD.

GROVE KARL GILBERT

(Read before the Academy, June 24, 1918.)

Dr. Gilbert was one of the most eminent geologists of the world, and as he was a native of Rochester and an honorary member of this society the Rochester Academy of Science has special pride in his life and work.

Dr. Gilbert was born in Rochester, May 6, 1843. His father was the well-known portrait painter, Grove Shelden Gilbert. An older

brother, H. Roy Gilbert, remained in the city as manager of a milling business until his death in 1902; and a sister, Mrs. Peter Loomis, is yet living in Jackson, Michigan. During Gilbert's boyhood the family lived at the junction of Exchange and Clarissa streets, but about 1861 land was purchased and a cottage built at the intersection of Culver Road and Merchants Road.

Karl, as he was always called by his family and intimates, was a studious boy, graduating at the Rochester High School at the age of 15, and from the University at 19. He was tall, slender, thin-chested and rather delicate, being overgrown for his years. As a condition of going to college he was required to take out-of-door exercise, and spent much time rowing on the Genesee River, and in later years on Irondequoit Bay.

He is remembered as a quiet, modest boy, with pleasant manners, very kindly disposition, and of very even temper. He was a good student, apparently indifferent to college honors and prizes. He was strong in mathematics, which explains his facility in the handling of geologic problems involving mathematics and physics. He had a keen sense of humor, and Rossiter Johnson, a classmate, says that he wrote skits for the college paper. The following passage in a letter from him in November, 1917, illustrates his happy temperament. After saying that he hand-printed thousands of the labels in the Ward Collections of the University Museum he adds: "Your inquiry calls to memory an embellishment that proved to be only temporary. In a collection installed for the Buffalo Academy of Sciences was a cast of an impression, on Connecticut sandstone, of a saurian who rested on feet, tarsals and tail; and I added in the margin of the label a quotation from King Richard—'all places yield to him; here sits he down.' This struck Ward as an exhibition of undue levity, and a new label was written."

It is said that he was sometimes absent-minded, but took the jokes about it in good nature. His boyhood playmate, Mr. Robert Bell, writes: "I would judge that Karl was of too kindly disposition to make a successful teacher of youngsters; they would take advantage of him."

In 1862 young Gilbert graduated at the University of Rochester. He had no decision as to vocation, but did not wish to enter any

of the so-called learned professions. In one year of teaching, as principal of schools at Jackson, Mich., he paid his debt incurred at college, and returned to Rochester. Until 1868 he was assistant to Henry A. Ward in the preparation of natural science material, and the installation of museums. Whether he had any offer from Ward before he returned to Rochester we do not know. He could not previously have been associated with Ward, who was nine years his senior and was in Europe until Karl was a Sophomore or a Junior. Chester Dewey was the teacher of chemistry and natural sciences until 1861, when Ward took the latter subjects. Ward's wonderful collections were on exhibition in the city in 1861, and were purchased for the college in 1862; but there is no intimation that Gilbert had any connection with Ward and the museum until 1863.

As noted above, many thousands of the labels in the University Geological Museum, which contains the famous Ward Collection, carry the pen-work of young Gilbert. His work on the zoölogic and geologic material of Ward's Natural Science Establishment probably determined his future scientific career. There is no suggestion that he previously had any particular interest in natural history or earth science.

During the five years with Ward's Natural Science Establishment Gilbert's work in the handling of geologic material and the installation of museums was a fine experience. In an appreciation of E. E. Howell (in volume 23, Bulletin of the Geological Society of America), Gilbert says that Ward's Establishment was Howell's real school; and after naming some of the men eminent in science who had received their early training at Ward's he adds: "And in addition to these the writer, who ranks himself somewhat proudly as senior alumnus." He had immediate charge of the mounting of the Cohoes Mastodon, in the State Museum at Albany, and his first publication related to the conditions of the entombment of the animal. In this article (in the 21st Annual Report on the New York State Cabinet, 1871, pages 129–148), after describing the geologic features, he made an estimate of the time subsequent to the burial of the Mastodon, based on the recession of the walls of the Mohawk channel under atmospheric erosion; using as a chronometer the slow growth of stunted cedars that were clinging to the

steep cliffs of the river gorge. Dr. John M. Clarke has referred to this work of Gilbert (in Science, volume 10, 1899, page 695) as the first attempt of the kind ever made. The field work was done in 1866, when Gilbert was only 23 years of age, although the paper may have been completed a couple of years later. It is a fine example of Gilbert's philosophic method and of his ability.

In 1869 he began, on the Ohio Geological Survey, under Professor J. S. Newberry, his geologic work. That this work was deliberate choice appears from the "Historical Sketch" by Newberry, in the report for 1869 (page 9), where we read:

"Of the other members of the corps, Messrs. Gilbert and Sherwood were geologists who had devoted much time to practical geology in New York and Pennsylvania, and who, for the purpose of adding to their experience, volunteered their services for no other compensation than their traveling expenses."

In the report for 1870 Dr. Newberry writes:

"The fossil fishes and fossil plants found in the state have been described by myself. They have been drawn by Mr. T. Y. Garner and Mr. G. K. Gilbert in a style that has not been surpassed in this country, and some of their work is equal to any of a similar character done by the best European draughtsmen" (page 8).

This volume contains a short report by Gilbert on three counties in the northwestern part of the state. A fuller report on the same district is attached to a report on the surface geology of the Maumee Valley, found in Volume 1, of the final reports of the Newberry survey. This writing, published in 1873, contains six maps, evidently all his own work. The first two maps show the beaches of the ancient glacial waters in the Maumee Valley, and the correlation of the highest shore with the pass at Fort Wayne.

These fine maps are the first ever made in delineation of ancient lake beaches and correlation with the controlling outlet. The field work for this report was done in 1869 and 1870, when he was only twenty-seven years of age. At this time Gilbert did not recognize the receding ice sheet as the dam that held up the ancient waters, but he did clearly postulate deformation of the earth's surface as one cause of the variation of levels. He says (page 551):

"The more general conclusion that the system of raised beaches signify a succession of flexures of the earth's surface, rather than successive stages of subsidence due to the gradual removal of a barrier of tide water, or the gradual wear of a barrier of stone, does not rest on this single fact."

Even then he knew something of the change of levels in the Ontario basin, for he immediately says, in citing other similar facts: "There is evidence that Lake Ontario, at Rochester, N. Y., has stood 70 feet lower than it does now" (page 552). Some sentences in the same connection illustrate his capacity for generalization.

"While these facts abundantly prove that a simple theory of gradual drainage, by the elevation en masse of the lake regions, is entirely inadequate, they are too fragmentary to define clearly the general synchronism and sequence of the local movements to which they testify. Nevertheless, it is something to have learned that the writhing of the surface of the earth, which has in the ages so many times remapped the continents, has also been the great immediate cause of the transformations of the great lakes, and that, continuing through the latest distinguishable geological epoch and its prolongation the historical, it has not now ceased."

Dr. Newberry was the first geologist to recognize the ice barrier as the cause of the high-level waters in the Laurentian basin, and it is interesting to find a footnote over his initials, at the bottom of the same page (552), reading as follows:

"In the discussion of these facts cited by Mr. Gilbert, and others of similar character, it should be remembered that the retreating glacier must have, for ages, constituted an ice dam that obstructed the natural lines of drainage, and may have maintained a high surface level in the water-basin which succeeded it."

The substance of Gilbert's report in the 1873 volume of the Ohio Survey had previous publication by permission in the *American Journal of Science* in 1871. An abstract was also printed in the proceedings of the New York Academy of Sciences of February 20, 1871 (pp. 175–178).

In 1871 Gilbert joined the Wheeler survey of the western territories and began the many years of work in the far west. From 1875 he was on the survey under Major Powell. The United States Geological survey was organized in 1879, with Clarence King as director, and young Gilbert became a member. From that time

to his death, May 1, 1918, he was continuously on the national survey.

Gilbert was not a prolific writer, as compared with others and judged by his work and ability. Down to 1891 the bibliographic list carries 70 titles, four of which have associated authors. His initial publication, in recognized geologic mediums, was in 1871, on the Cohoes Mastodon in the twenty-first annual report of the New York State Cabinet of Natural History. His next three articles have been noted above, relating to Ohio geology and the ancient beaches. From 1871 his papers are mostly in description of features of the western country. The most important of his earlier papers is the report on the Henry Mountains, published 1877. In this classic paper he described a new type of mountains, now fully recognized. These were originally domes, or areas of sedimentary strata lifted by the injection of lava from beneath. Quoting his own description, page 19:

"The lava of the Henry Mountains behaved differently. Instead of rising through all the beds of the earth's crust, it stopped at a lower horizon, insinuated itself between two strata, and opened for itself a chamber by lifting all the superior beds. In this chamber it congealed, forming a massive body of trap. For this body the name laccolite (cistern-stone) will be used."

In later years the name has been changed to laccolith. Subsequent erosion of these uplifts by doming has often destroyed the arching form or obscured the primitive shape and exposed the injected igneous heart. The latter part of this book is a discussion of land sculpture. In this statement of the principles of erosion and the origin of topographic forms he shares with Newberry and Powell the honor of a pioneer.

Probably his most famous writing is the work on Lake Bonneville. This is the initial volume of the series of quarto monographs published by the National Survey, and bears the date 1890. This describes the wide expanded predecessor of the present Great Salt Lake, which existed in glacial time when humidity and rainfall of the Great Basin produced the vast lake which overflowed northward to the Columbia River. Great Salt Lake is only the saline remnant of that dessicated fresh-water body.

GROVE KARL GILBERT

1843–1918

This handsome quarto volume contains a chapter on "Topographic Features of Lake Shores" which is the classic writing on shore-line topography.

It is interesting to note that he published no articles relating to the Rochester region until after his long period of western exploration. His best publication in reference to the Ontario basin was in 1885, on the Iroquois shoreline; although he then called it simply the old shore-line of Ontario. Between then and 1891 he published six papers on the Pleistocene features or glacial history of the Ontario basin; and one on the sink ridges near Caledonia.

From 1892 to 1900, eight years, his list of writings is forty; covering a wide range of subjects in geology. Of these eight related to western New York. From 1901 to 1905 twenty-five titles are on record, of which only two concern western New York. During 1906 and 1907 he published nine articles, one being on Niagara. In 1908 only four articles, including another on Niagara, are recorded in the bibliography. Since 1908 only five titles are credited. Altogether this makes 156 titles, of which 18 relate to the geology of western New York or the Ontario basin.

The few papers published in later years is explained by his poor health, due to a slight stroke of apoplexy. After this time by very careful living he was able to do some work in a deliberate way. His latest study was the transportation of detritus by streams, with reference to hydraulic mining in California. This work, spread over several years, was published last year, being his last publication. It is entitled "Hydraulic-mining Debris in the Sierra Nevada," and is Professional Paper 105 of the Survey list, forming a quarto of 154 pages, with numerous maps and reproduction of photographs.

Dr. Gilbert's only writing for school textbooks in his "Introduction to Physical Geography," in collaboration with Professor A. P. Brigham. This was published in 1892 by D. Appleton and Company.

Geology is so broad and comprehensive and so inviting in many directions that some men with active minds and lively interest scatter their studies over diverse fields. Dr. Gilbert more wisely confined his work to physical geology, especially geodynamics, in which he was recognized as a master. He published practically nothing

in biologic geology or paleontology; and almost nothing in stratigraphy and petrology.

His geologic interest in his home region was mainly in glacial problems, especially the glacial lake Iroquois and the deformation of the Ontario basin. He was the first geologist to appreciate the complexity of the Pleistocene history of the valley. As early as 1885 he recognized the three controlling factors: (*a*) the damming effect of the waning glacier and the glacial nature of the earlier waters; (*b*) the succession of water levels due to opening of different outlets or places of escape for the impounded waters, by the recession of the glacier front; and (*c*) the dislocation and canting of the water planes by the tilting uplift of the land. His accurate conclusions regarding the complex history are embodied in a number of short papers, and especially in a chapter in the "Sixth Annual Report of the Commissioners of the State Reservation at Niagara for the year 1890." The title of this important but little-known paper is "The History of Niagara."

Dr. Gilbert's mind was of the reflective, philosophic type. He sought for the explanation and relationship of phenomena. His calm judgment and clear discrimination joined to a spirit of fairness and with gentle manners caused him to be much sought as a critic and helper. He was a sort of father-adviser to the members of the Survey. Doubtless much of his thought has found expression in the writings of the younger men who revered and loved him. The writer of this appreciation never heard him say a harsh word of anyone. He was reserved in personal matters, but it is known that the death of a young daughter affected and saddened his life. His wife, who was Fannie L. Porter, died over twenty years ago. Two sons are living. The eldest, Archibald Marvin Gilbert, is a successful civil engineer, in reclamation and irrigation work in the west; and had charge of the construction of the great Salmon River dam.

Dr. Gilbert received many honors. The University of Rochester gave him the master's degree in 1872, and the LL.D. degree in 1898. The latter degree was also conferred by the University of Wisconsin in 1894, and by the University of Pennsylvania in 1897. He gave special courses of lectures at Cornell, Columbia and Johns Hopkins universities. He was the fourth president of the Geolog-

ical Society of America, in 1892, and was again president in 1909, the only man honored by a second term. In 1899 he was president of the American Association for the Advancement of Science, probably the highest honor in the gift of American science. Naturally he was active and prominent in the scientific societies of the national capitol, and was a member of the National Academy of Sciences. He was a Foreign Fellow of the Geological Society of London, and received its Wollaston Medal in 1899. He was President of the American Society of Naturalists, 1885–1886; Philosophical Society of Washington, 1895; Association of American Geographers, 1908. He received the Walker Grand Prize from the Boston Society of Natural History in 1908. He was a member of the Delta Upsilon college fraternity.

H. L. FAIRCHILD.

EDWIN EUGENE HOWELL

(Read before the Academy, December 9, 1918.)

Howell was one of the interesting group of men who have won distinction in science and received their early training in Ward's Natural Science Establishment.

He was born in Genesee County, March 12, 1845, and died in Washington, D. C., April 16, 1911. His youth was passed on a farm with early education in the country schools. His sister was Henry A. Ward's first wife, which relation doubtless explains his entrance to Wards' establishment in 1865, at the age of 20, where he remained until 1872, when he joined the government surveys in the far west. G. K. Gilbert was at Ward's for three years after Howell arrived, and left the Ohio Survey for the Wheeler Survey in 1871, and it is surmised that it was through Gilbert that Howell also joined the Wheeler party. On this survey, the U. S. Geographical Survey West of the 100th Meridian, Lieutenant George M. Wheeler in charge, he remained two years, and in 1874 became a geologist on the Powell Survey of the Rocky Mountain region. In these surveys he made reconnaissance in Utah, Nevada, Arizona and New Mexico. There is a suggestion in Gilbert's memoir* that Howell left the Survey with the conviction that it

* Bulletin Geological Society of America, volume 23, pages 30–32.

was not the vocation for which he was best fitted. At any rate he returned to Rochester, and at a time of financial stress in the Ward establishment he purchased one-half interest in the mineralogic and geologic material of the institution, and until 1892 the geological branch of the business was in the firm name of Ward & Howell.

In 1875 he constructed a relief map of the Grand Canyon of the Colorado, for the United States Government exhibit at the Centennial Fair at Philadelphia in 1876. He claimed that his relief map of the island of San Domingo, made in 1870, was the first relief map made in the United States. In 1892, on the reorganization of the Ward establishment, he disposed of his interest and removed to Washington, D. C., where he organized his own establishment, which he called "The Microcosm," somewhat after Ward's original building called "Cosmos Hall," but restricted to geologic materials and relief maps. Of this work Gilbert wrote:

> "The modeling of relief maps, in which work he was a pioneer,—if not *the* pioneer—for the United States, soon became a specialty; and his monument for a generation at least will consist in the plastic representations of physiography, topography, and geologic structure which adorn the halls and walls of museums and school-rooms throughout the continent.
>
> Personally, Howell was quiet, unassuming and sincere. He recognized that integrity was an important factor in his business success. If he had enemies or detractors, I have not met them. . . . His clients found him ever clamorous for facts and anxious to revise work at any stage if it could thus be made more truthful; and his clients, who were numerous among the investigators and teachers of geology and geography, were also his friends."

The University of Rochester recognized some special studies and conferred on him the degree Master of Arts (Honorary) in 1880.

After the reorganization of the Academy in 1888 Howell became active in the Society, being Chairman of the Section of Geology, 1889–1891; and Treasurer of the Academy, 1890–1891.

The bibliography of the U. S. Geological Survey credits Howell with five titles of reports for 1874–1877, three being in collaboration with Gilbert and others. The first volume of the Academy Proceedings contains two articles by him in 1890, 1891, describing nine new meteorites. Other papers on meteorites were printed in the American Journal of Science for 1887, 1888, 1892 and 1895.

Mrs. Howell, who was Annie H. Williams, died in 1893. A son and daughter are living.

H. L. FAIRCHILD.

SAMUEL ALLAN LATTIMORE

(Read to the Academy, February 24, 1913.)

In the death of Dr. S. A. Lattimore, the Rochester Academy of Science loses one of its oldest members, and it is fitting that the Society should make acknowledgment of its appreciation of his character and his work as a scientist, and give expression to its deep sense of loss.

Professor Lattimore was born in Union County, Indiana, May 31, 1828, and died February 13, 1913. He graduated at DePauw University in 1850, and remained there as classical tutor two years and as Professor of Greek until 1860. He then went to Genesee College, at Lima, N. Y. as Professor of Chemistry, and in 1867 was called to the similar chair in the University of Rochester, where he remained until his retitrement in 1908. He received the A. M. degree in 1853 from DePauw, and the Ph.D. from both DePauw and Iowa Wesleyan University in 1873; and the same year the LL.D. degree from Hamilton College.

In 1896–1898 he was acting President of the University of Rochester. After 1881 he was chemist to the New York State Board of Health, and to the New York Dairy Commission after 1886.

The Rochester Microscopical Society, from which the Academy of Science sprang, was organized in January, 1879. The first meeting, as a conference, was held in Professor Lattimore's lecture room in chemistry, the southeast room on the first floor of Anderson Hall. On the formal organization of the Society Professor Lattimore was elected President, continuing in office one year.

The Microscopical Society was started at a time when there was popular interest in the use of the microscope and its accessories, and the enthusiasm of its members soon made it a great success. In 1881 it had become the largest organization of the kind in America, and its annual public exhibitions, or Soirees, were occasions of great popular interest and largely attended.

The Microscopical Society having been so successful and the

desire for a society that should cover a larger field being increasingly manifest, in two years an expansion of the organization was made, and the Rochester Academy of Science was incorporated May 14, 1881. The names of the incorporators were Myron Adams, H. F. Atwood, C. E. Rider, H. C. Maine, Adelbert Cronise, S. A. Lattimore, William Streeter and Cyrus F. Paine. The Microscopical Society was merged in the Academy as the Section of Microscopy.

From the first, Dr. Lattimore was an interested and leading member of the Academy, always willing to give the benefit of his wide scientific knowledge for the good of the organization. In later years, on account of his services, he was made an Honorary Member of the Society.

Dr. Lattimore did not present many formal papers to the Academy, but he was a frequent speaker in an informal way at the meetings. His special interest was, of course, in chemistry, but he was one of the old-time school of scientists whose knowledge extended over a broad field, and he was able to discuss almost any scientific subject with intelligence and true appreciation of its merits. His remarks were always so interesting, his illustrations so apt, his examinations so clear and his manner of presenting a subject so simple and lucid that he was always a welcome speaker. His dignified but pleasant manner, of the old-school courtliness, made him an ideal presiding officer when called upon to fill that position.

Such was Dr. Lattimore's reputation as an expert chemist, that he was frequently called upon by industrial corporations, municipal authorities, and courts of law for analyses, investigations, and expert testimony. As a chemist in the State Agricultural Department for many years he rendered important assistance, and twice he served as a member of the national commission of chemists to test the gold and silver coinage of the United States.

In 1872 he was employed by the Rochester water commissioners to test the water of all streams and lakes which were supposed to be available for the city water supply, and it was on the basis of his analyses and advice that the city purchased Hemlock lake, and later, Canadice lake.

In 1889, on account of an epidemic of typhoid fever at Spring-

water, which is within the drainage area of Hemlock lake, an analysis of the water of this lake was made by Professor Lattimore. The results of this examination were published in the proceedings of the Academy in connection with a paper given by George W. Rafter and Dr. M. L. Mallory on the subject of this epidemic.

On May 14, 1894, Dr. Lattimore read an able paper before the Academy on "The Recent Epidemic of Typhoid Fever in Buffalo," drawing particular attention to the imperative necessity of a close attention to the water supply of a city, and congratulating Rochester on the fact that its supply was drawn from Hemlock lake instead of Lake Ontario. This was printed in volume 2, of the Proceedings, pages 270–278.

Dr. Lattimore was ever progressive and kept fully posted on all matters of scientific interest. At a meeting of the Academy held October 28, 1895, he described the newly discovered element Argon and discussed its nature, its utility, and the manner in which it was discovered. In October, 1898, he described in a very interesting manner the geological formations and natural beauties of Mount Desert Island, on the coast of Maine, where he had spent his vacation.

Dr. Lattimore was always deeply interested in all that pertained to the welfare of Rochester, and was specially anxious that the city should do everything possible to preserve its beautiful natural features. In April, 1895, at the conclusion of a lecture by Professor H. L. Fairchild on the Geology of the Pinnacle Hills he presented the resolutions, unanimously adopted by the Academy, and printed in the Proceedings, volume 3, pages 178–179.

Dr. Lattimore's latest appearance before the Academy was last October, when, at a meeting devoted to a Retrospect of Science in Rochester, he spoke informally, in his usual pleasant manner, of the work of Professor Lewis Swift in astronomy, and supplemented Professor Fairchild's remarks on the work of Professor Henry A. Ward by a number of interesting personal reminiscences of that distinguished scientist and traveler.

FLORENCE BECKWITH.

WILLIAM STREETER

(Read before the Academy, December 18, 1916.)

In the death of Major William Streeter the Academy of Science lost its oldest member, both in years and in length of service, and one to whom the Society owes a great debt of gratitude.

Major Streeter was born at Whitingham, Vermont, October 11, 1834. His early life was spent on a farm. At the outbreak of the civil war he enlisted in the ranks, and belonged to the Tenth Massachusetts, a fighting regiment. He participated in eighteen engagements but escaped with only one wound. His rank as Major came by successive promotions, and it is said that he declined the promotion to Colonel, in favor of another officer.

Of the years following the civil war we have no record. Coming to Rochester in 1868 he engaged in business as a lock manufacturer, but soon entered the employ of the Sargent & Greenleaf Company as Superintendent; which position he held for almost 50 years. His unusual mental and physical vigor was shown by his ability to carry on his work until within four months of his death.

He was one of the original members of the Rochester Microscopical Society, organized in 1879, from which developed the Rochester Academy of Science. He was one of the incorporators of the Academy, in 1881, of whom only four are now living, H. F. Atwood, Adelbert Cronise, H. C. Maine and Cyrus F. Paine.

In the section of Astronomy, in the early days of the Academy, he was a very active member, having a fine telescope mounted in an observatory on the roof of his house. He was also an active member in the Section of Microscopy, and always retained his interest in microscopic work. His collection of microscopic objects and appliances was probably the largest and best in Rochester. He was always most generous in his services to all who needed expert help in study or identification of microscopic forms.

Major Streeter retained his membership in the Academy from its beginning until his death, in December, 1916. But his diffidence and modesty prevented him from taking an active part in the general meetings. The only offices which he ever consented to accept

were those of Councillor, from 1889 to 1892; and Vice-Chairman of the Botanical Section from 1889 to 1915.

In 1899 he was made a Life Member of the Academy, on account of his having been a charter member; a man eminent for scientific accomplishments, and one who through the whole life of the Academy had worked for its success. But Major Streeter's special service to the Academy was as host and helper to the Botanical Section, to whose meetings he freely and cordially opened his house for more than twenty-six years; with the additional privilege of the use of his extensive library and microscopical resources. The continued life of the Section, as well as the successful work which it has accomplished, are largely owing to Mr. Streeter's kindness and hospitality in affording it a permanent meeting place. In the study of algae, mosses and lichens he was deeply interested, and did very fine microscopical work in connection with them, arousing much enthusiasm in the members of the Section.

Mr. Streeter was a man of refined tastes, with a keen appreciation of the best in literature, music and art; a close observer; well versed in several branches of science, and an ardent lover of nature. Those who had the privilege of taking strolls with him through forests and along streams will never forget his delightful companionship.

Personally he was a man of strong traits of character and positive convictions, yet ever genial and courteous in his intercourse with friends and associates.

The members of the Academy, and particularly of the Botanical Section, desire to express their appreciation of the life and worth of Mr. Streeter, their gratitude for his great assistance, their deep sense of loss, and their sympathy for the members of his family.

FLORENCE BECKWITH,
MARY E. MACAULEY,
M. S. BAXTER,
H. L. FAIRCHILD,
Committee.

MAJOR ALBERT VEEDER, M. D.

(Read before the Academy December 9, 1918.)

During the years 1889 to 1899 Dr. M. A. Veeder was the Academy's mentor in matters of meteorology and solar physics. Living at Lyons and doing the work of a country physician and local health officer he took the time to attend our meetings and brought the results of his intensive studies in a subject foreign to his medical work. He was a remarkable man in his capacity for patient collection and tabulation of numerical data, his grasp of their significance, his prevision of the elusive relation between terrestrial phenomena and solar conditions, and his fearless persistency and confidence in urging his own conclusions. For in his study of electro-magnetic phenomena he was in advance of his day and his work was not appreciated. His appeals to the government bureaus were politely waived, and his writings neglected. How could a doctor in a country village discover any worth-while new truth in the difficult subject of solar influence?

But Dr. Veeder's work is coming into recognition. The eminent geographer and meteorologist, Professor Ellsworth Huntington, has published an appreciation of Veeder's work and writings in the Geographical Review of April, 1917 (Vol. 3, pages 188–211; 303–316). He says (page 188), "I can say with confidence, however, that in the study of meteorology I have come upon no writings which have stimulated me more than those of Dr. M. A. Veeder. His hypotheses may prove wrong, but that will not destroy the stimulating character of his broad and original ideas."

When Dr. Veeder joined the reorganized Academy, in 1889, he had published a 4-page article on the Aurora in the Siderial Messenger, and had privately printed an 8-page pamphlet. The writer of this memoir urged him to prepare fuller statements of his studies and theories for publication in the Proceedings of the Academy; with the result that six papers of his were printed in the first two volumes. These articles were on the Aurora, Storms, Zodiacal Light, and Solar Electrical Energy. No one in the Academy nor in Rochester was able to judge and correctly value these writings. They were technical, advanced physics, and objections were made

to giving so much space to abstruse solar physics, and perhaps erroneous theories. But the money of the Academy was well spent in giving him a hearing and placing his work on record. That kind of mental activity deserves cultivation; and the correctness of the conclusions are of less importance. Mental geniuses are the hope of the race; and we may entertain angels unawares. Professor Huntington expresses this thought in the first paragraph of his article.

"To-day the poets and reformers seem to make their voices heard in almost every village. The careful, unostentatious scientist is the man most apt to do his work unheralded and unrewarded. There is perhaps no greater economic waste than that which condemns a man of great originality to spend his time in the ordinary round of common duties rather than in carrying on the so-called impractical investigations which are the essential foundation of all the so-called practical advances."

Dr. Veeder was born at Ashtabula, Ohio, November 2, 1848. He graduated at Union College in 1870. From 1875 he was Principal of Ives Seminary, at Antwerp, N. Y. In 1878–1879 he studied at Leipzig, Germany. He graduated in medicine at the University of Buffalo in 1883. To his death, November 16, 1915, he lived in Lyons. His devotion to thought beyond the common range and his interest in many things outside his medical practice were the cause of suspicion and criticism from people who could not understand and appreciate the unusual man. But he was a skillful physician and alert in medical science. On October 25, 1898, he read a paper before the Adacemy on "The spread of typhoid fever and kindred diseases by flies." His paper on that subjected printed in the Medical Record a month previous is believed to have been the first recognition of the fact.

Dr. Veeder was interested in the geologic features of his district, and wrote fugitive papers on this and other subjects. That his views on subjects apart from his specialties were sometimes more original than correct, was to be expected of a man with such active mind and fearless expression.

Professor Huntington's article discusses Dr. Veeder's work and his conclusions, and includes some writings that Veeder left in manuscript. A portrait is given. The following quotation is from the paper:

". . . In connection with Peary's polar expeditions he distributed over 5,000 blanks to observers in all the continents, in order to have simultaneous records from as wide a region as possible. It was always a pleasure to Dr. Veeder that people in many lands took such interest in recording and reporting auroras for him. These aurora studies led him to consider the relation between the activities of the sun and the earth. The result was that by 1895 he had framed an hypothesis which may possibly prove to be one of the most important contributions not only to meteorology but to astronomy."

"This modest, unassuming, but highly gifted man should never have been obliged to get a living by practicing medicine. He ought to have been connected with some great scientific institution where he would have been free to carry on his researches untrammelled by anxiety about the support of his family. His mind was extraordinarily fertile in ideas, not only in respect to his own profession but along other scientific lines. He appears to have been the first to publish an article clearly setting forth the now well-accepted idea that typhoid germs are carried by flies, and it was upon his advice that the medical department of the United States Government adopted its successful policy of preventing the spread of typhoid fever in Cuba and in the southern camps of our soldiers during the Spanish War. He was also a pioneer in advocating the open-air treatment of tuberculosis, and was perhaps the first adequately to explain it. . . ."

H. L. FAIRCHILD.

JOHN MASON DAVISON

(Read before the Academy, February 12, 1917.)

The subject of this sketch was born in Albany, N. Y., December 18, 1840, of New England ancestry. His father, bearing the same name, was Registrar in Chancery of the State of New York from 1839 to 1848. Mr. Davison senior became President of the Saratoga and Whitehall Railroad Company, and also of the Adirondack Railroad Company. His mother, Sarah S. Walworth, was the daughter of Reuben Hyde Walworth, who was for many years Chancellor of the State. In 1848 the family removed to Saratoga Springs.

Mr. Davison's early education was in the academies of Saratoga Springs and Ballston Spa, and in the Canandaigua Academy. The Principal of the latter school, Noah T. Clarke, was his cousin. He entered Williams College in 1858 and graduated in 1862 with the degree Bachelor of Arts.

After leaving college he studied law for a short time in the office of an uncle in New York City. Early in 1864 he took employment in the Second National Bank of Detroit, Mich., and became Assistant Cashier in 1873. On account of poor health he retired from business in 1882 and returned to his former home in Saratoga Springs. In 1887 he came to Rochester and remained here until his marriage, in 1911, to Miss Emma O. Decker of Evansville, Ind. The next two years were spent in Europe and then he settled in Detroit, Mich. He died at Santa Barbara, Cal., on April 30, 1915, at the age of 74.

Mr. Davison joined the Rochester Academy of Science in 1889, and was elected a Fellow in 1890. He was a member of the Council of the Society during the years 1890–1892 and 1899–1904, a service of nine years. He was also First Vice-President for the years 1893–1898, but declined more responsible official position.

It is not known if Mr. Davison had more than a casual or general interest in mineralogy and chemistry before coming to Rochester, but during the 24 years of his residence in the City or suburbs his chief occupation was chemical study and analysis in the University Laboratory, a matter of intellectual pleasure and scientific curiosity. He declined to accept pay for analyses made for others, and would not undertake the examination of material in which he was not personally interested. His name was carried in the Catalogue of the University of Rochester during all the years from 1888 to 1911 as a special or graduate student, not a candidate for degree. This standing in the student body of the College assured him the required laboratory facilities, and all his mornings and many afternoons were spent in the laboratory. His analytic work was specially on meteorites, in which study he became an expert and a recognized authority. The attached list of 12 titles of papers is the permanent record of his scientific work.

Of rather slender figure, gray hair and beard, with refined and quiet though somewhat reserved manners, gentle in speech and immaculate in dress even when at work, standing day after day at his table Mr. Davison was for over 20 years a familiar figure to the chemistry students and an interesting and admirable personality. Here was a man of advanced age, with financial means and independence, able in every way to follow his pleasure, and yet

finding it in continuous study amid the fumes and odors of the chemical laboratory, instead of seeking diversion or working to amass money or gratify selfish ambition. To the students he was a fine example of unselfish devotion to the search for truth.

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H. L. FAIRCHILD.

GEORGE W. RAFTER

(Read to the Academy, December 9, 1918.)

This eminent hydraulic and sanitary engineer was born in Orleans, N. Y., December 9, 1856, and died at Karlsbad, Germany, December 29, 1907.

As a boy he attended the public schools, and spent three years

at the Canandaigua Academy. In 1872 he was an optional student at Cornell University.

During the years 1889–1900 Mr. Rafter was active in the work of the Academy, being Corresponding Secretary in 1890–1891, and recorder of the Section of Zoölogy in 1890. He was a pioneer in the application of biological and microscopical analysis to the water supplies of cities. His paper published in the Academy Proceedings, volume 1, pages 34–44, on the Biological Examination of Potable Water marked a notable advance in sanitation, and his method there described, with illustrations, is the one still in use. In conjunction with Dr. M. L. Mallory he also published in volume 1 a paper on the Springwater typhoid epidemic. His collection of Algae he presented to the Academy in 1896.

The city of Rochester is greatly indebted to Rafter for the devotion of his knowledge and ability to the city's engineering problems. In 1876, and again in 1883–1887 he was Assistant Engineer of the Rochester Water Works, and was Acting Chief Engineer in 1890. From June, 1888 to October, 1890 he was in charge of the work giving additional water supply to the city from Hemlock lake. He was widely employed in constructional work and as expert adviser, and his most important engineering work was in the employ of New York State, in water-supply investigation, control of river flow and plans for water storage. Of special interest to Rochester was his survey for Genesee River storage by a dam at Portage. He was a member of the Water Storage Commission. In 1894 he was sent abroad by the State Engineer to investigate bridges and dams. His work on the "Hydrology of the State of New York," forming the State Museum Bulletin No. 85, of 902 pages, is a monument to his ability and industry. Five papers in the Water-Supply Papers of the U. S. Geological Survey were written by him. His comprehensive work on sewage disposal, with Mr. M. N. Baker, has been a standard textbook. He was a prolific writer, but his bibliography has not been compiled.

An interesting account of Mr. Rafter's work and of his personality, written by Mr. J. Y. McClintock, is published in the Transactions of the American Society of Civil Engineers, volume 62, to which the writer is indebted for some items here given.

H. L. Fairchild.

EMIL KUICHLING

(Read before the Academy, December 9, 1918.)

Rochester owes a heavy debt to Emil Kuichling for the devotion of his high abilities and honest purpose to the engineering work of the city, and the Academy of Science is honored by his connection.

He was born at Kehl, Germany, January 20, 1848. His father, Louis Kuichling, a graduate in medicine of Gottingen and Freiburg, was sentenced to death for participation in the revolution of 1848, but escaped to America and settled in Rochester. Emil studied at private schools, and at the age of 14 was apprenticed to a master builder. Later he was employed in the office of the City Surveyor, and worked winters in the local office of the Erie Canal engineer. In 1868 he graduated at the University of Rochester in the Arts course, and in 1869 received the degree of Civil Engineer. Then in two years he covered the three years course at the Polytechnic School of Carlsruhe, Germany, obtaining another C. E. degree in 1872. All his vacations were used in practical work or in examination of engineering works in America or Europe. From 1873 to 1885 he was Assistant Engineer of the Rochester waterworks, and then was elected to the Executive Board of the city. This latter position he resigned in 1887 in order to superintend the construction of the East Side sewer. During trips to Europe he studied the details of European sanitary engineering and was recognized as a leading American authority in that branch of engineering, and his services as an expert were in demand. In 1890 he became chief engineer of the Rochester waterworks, resigning about 1900 to devote himself to his large private practice. He had much to do with the planning of the new conduit from Hemlock Lake and with the sewage disposal system that removes the sewage from the Genesee River. He was consulting engineer on the State canal work; was called as an expert in many important litigations; and was consulted by many cities in the United States and Canada on matters of water supply and sewage disposal. He was a member and officer of many engineering organizations and

public health associations. His contributions to scientific literature were many and valuable.

During the early years of this Academy Mr. Kuichling was an active Fellow. In 1895 and 1898 he described to the society the plans and the construction of the Hemlock conduit. The Rochester Engineering Society had its beginning as a Section of the Academy, with Kuichling as Chairman and J. Y. McClintock as Recorder.

He married Sarah L. Caldwell in 1879. He died in New York City November 9, 1914. "He was a true and faithful citizen and an able, fearless and kindly man, who left the impress of his work on the city of his adoption and the impress of his rich personality on all who were intimately associated with him."

H. L. FAIRCHILD.

JOHN WALTON

(Read before the Academy, December 9, 1918.)

Rev. John Walton was born in England, at Newcastle-on-Tyne, January 14, 1834. The name Walton came through his adoption in childhood by an uncle. At the age of 12 he attended for two years a Government School of Design and Art, and then was apprenticed to a house painter for the term of seven years. In 1860 he came to America with his family and goods, and to Rochester, by way of Canada, in 1863. For some years he worked for Frank VanDorn, the sign painter, and it was by Walton's work that the picture sign became popular.

His art work for James Vick began in 1870, but was interrupted by three years of ministerial work outside the city, 1874–1877. From lettering cases and designing labels he became the artist of the Vick Catalogue and the floral chromos, then in vogue. In 1879 Mr. Vick began the publication of Vick's Magazine, and Walton supplied the artistic illustrations for over ten years. He painted not only the colored plates of flowers and fruits but drew the black-and-white sketches and the charming head and tail pieces. He was also employed by the leading physicians of the city to make colored drawings of surgical cases; and in the later years he was employed by the Park Board in preparation of botanical pictures.

For years he was also the color artist at Ward's Natural Science Establishment.

Before leaving England Walton had been a Local Preacher in the Primitive Methodist Church, and at different times from 1864 to 1886 he was in charge of churches of the Methodist denominations, in and outside of Rochester; even as far as Tamaqua, Penn.

It is said that from childhood Walton was fond of the out-of-doors, and it was but natural that such a skillful artist of plant life should be interested in the associated animal life. He became an authority on the molluscan fauna. Two papers by him were published in the Academy Proceedings; one on the occurrence of Mesodon Sayii, in volume 1; and an extended paper on the Mollusca of Monroe County, in volume 2. The latter paper is beautifully illustrated by eight plates of outline drawings by his own hand. His collection of shells was presented to the Academy in 1891, on which account he was later elected a Life Member. For many years he was the Curator in Conchology. He was especially active in the Botanical Section, and the records of the public meetings have many references to his participation. In 1897 he read a paper on the fertilization of Orchids, which was not published.

Apart from Mr. Walton's work in the ministry his most serious occupation was his floral artistry. He had the ambitious plan of publishing a work on the wild flowers of the Rochester district, illustrated by his own colored sketches, and he painted a great number of flowers from life, in the woods and fields. The plan did not mature, but many of his charming pictures are in possession of members of the Botanical Section, and most highly prized.

John Walton was a man of unusual artistic ability and a true scientific spirit; in character unselfish, in manners gentle and refined; a lovely spirit. He was married three times. His later years were enfeebled, and he died May 13, 1914, at the age of 80.

H. L. Fairchild.

RICHARD MOTT MOORE, M. D.

(Read to the Academy, December 9, 1916.)

Dr. Moore was the strongest representative of the Academy in the serious study of entomology since the death of Mr. Robert

Bunker, in 1892. He was born November 23, 1856. His early education was in private schools, with some work in 1873–1875 at the University of Rochester. He graduated at the Buffalo Medical College in 1878, and very soon began medical work with his father, the eminent physician and surgeon, Edward Mott Moore, senior, and he continued in medical practice to his death, September 23, 1916. For a time he was an instructor in the Buffalo college. In 1893 he was appointed a member of the Rochester Board of Health. He was a member of several medical and health associations, and was President of the Rochester Academy of Medicine in 1910–11.

From his childhood Dr. Moore was interested in insects, and in his mature life the pursuit of entomology was his avocation and recreation. His special branch was the coleoptera (beetles), but he had intimate knowledge of other insect orders.

In the Proceedings of the Academy he published no papers, but made contributions to American entomological journals and issued a paper on "Habits of the Cicindela" and "Observations on Mayflies." He had in preparation a book on beetles, but was anticipated by Blatchley. When his fatal illness came he was collecting material for a paper on the carrion beetles.

The Section of Entomology of the Academy was organized by the group of young men that Dr. Moore had attracted about him for the study of insect life, and he was made the Chairman. His valuable library and his collection in entomology were bequeathed to the University of Rochester.

H. L. FAIRCHILD.

HARRY L. PRESTON

(Read before the Academy, December 9, 1918.)

For many years Mr. Preston was the Academy's expert and authority in mineralogy and petrography. He was born in Philadelphia in 1856, and spent his early life there. He graduated at the Newton School, in West Philadelphia; and for a time attended the University of Pennsylvania. His work in mineralogy began with his employment by Dr. A. E. Foote, the well-known dealer in minerals. Preston had charge of Foote's exhibit at the Cen-

tennial Exposition. About two years later he met Professor Henry A. Ward, who appreciating his skill, induced him to come to Rochester; and until his death, June 15, 1904, he was continuously in the Ward's Establishment. Professor Ward is quoted by Charles H. Ward as saying that Preston was the most proficient man he had ever known in the instant identification of minerals and rocks.

Preston was active in the Academy from 1889 until near the time of his death. He was Secretary of the short-lived Section of Geology in 1889–1891; and was one of the Council in 1891 and 1893.

Preston's published writings related to meteorites. Volumes 2, 3 and 4 of the Academy Proceedings contain four papers; one being the description of a new and excellent method for etching iron meteorites so as to display their crystalline structure. The two later papers were also printed in the Journal of Geology, Volume 4. Five papers were published in the American Journal of Science, volumes 5 and 9, between 1898 and 1900. A tenth paper, his last, on a meteorite from Niagara, North Dakota, was printed in the Journal of Geology, volume 10, 1902.

H. L. FAIRCHILD.

LIST OF PAPERS READ BEFORE THE ACADEMY

DATE	AUTHOR	TITLE
1910.		
Oct. 24,	HARRISON E. HOWE,	The chemical composition of optical glass.
Nov. 14,	RICHARD M. MOORE,	Dragon-flies.
Nov. 28,	CHARLES C. ZOLLER,	Photographs in colors of nature, by the Lumiere process.
Dec. 12,	WILLIAM F. DEVENDORF,	The telephone, its inventors, successive forms and operation.
1911.		
Jan. 9,	CHARLES WRIGHT DODGE,	Demonstration of anatomy with the projection microscope.
Feb. 13,	ROLAND COLE,	Modern office systems.
Mar. 13,	GEORGE W. KELLOGG,	Customs of the Indians on the Tonawanda Reservation.
Mar. 27,	CHARLES E. LEE,	Mines and miners of Mexico.
Apr. 10,	Committee of the Botanical Section,	Early botanists of Rochester. (Printed as pages 39–56 of this volume.)
Apr. 10,	WILLIAM D. MERRELL,	Algae of the vicinity of Rochester.
Apr. 24,	REUBEN A. PUNNETT,	Occult phenomena and psychological marvels.
May 28,	GEORGE E. FELL,	The currents at the east end of Lake Erie, and their influence on the sanitation of Buffalo.
Nov. 27,	JOHN R. WILLIAMS,	The modern conception of the physiology of digestion.
Dec. 11,	J. L. ROSEBOOM,	Esperanza as the universal language of science.
1912.		
Jan. 8,	JOHN F. SKINNER,	The Panama Canal, and life on the Isthmus.
Jan. 22,	VICTOR J. CHAMBERS,	The chemistry of coal.
Feb. 12,	A. L. BENEDICT,	The life of western New York Indians.
Mar. 1,	CARL E. AKELEY,	Hunting big game in Africa.
Mar. 11,	HARRISON E. HOWE,	Manufacture of beet sugar.
Mar. 11,	CHARLES C. ZOLLER,	Rochester beautiful in the colors of nature.
Mar. 25,	JOHN M. SWAN,	Biology of the malarial parasites.
Apr. 8,	CHARLES W. DODGE,	Sensory activity of plants.

DATE	AUTHOR	TITLE
Apr. 22,	HERMAN L. FAIRCHILD,	The history of the removal of the ice sheet from New York State.
May 13,	C. W. HENNINGTON,	Poisonous snakes.
May 27,	ELON H. EATON and FLORENCE BECKWITH,	Bergen swamp, etc.
Oct. 14,	H. L. FAIRCHILD, FLORENCE BECKWITH, S. A. LATTIMORE, C. W. HENNINGTON,	Retrospect of science in Rochester.
Oct. 28,	WILLIAM S. MAGILL,	Antitoxines and vaccines.
Nov. 25,	HOWARD D. MINCHIN,	Absorption values of glass.
Dec. 9,	A. L. BENEDICT,	Food values; physiologic and economic.
1913.		
Jan. 13,	W. D. BANCROFT,	The theory of dyeing (joint meeting with the Rochester Section of the American Chemical Society).
Jan. 27,	HERMAN L. FAIRCHILD,	Maps of New York State under the latest ice sheet.
Feb. 10,	HARRISON E. HOWE,	Chemical experiments with the aid of projection.
Feb. 10,	CHARLES C. ZOLLER,	Views of Rochester in colors of nature.
Feb. 24,	CHESTER F. STILES,	Mountain climbing of Mt. Washington in winter.
Mar. 10,	VICTOR J. CHAMBERS,	The preparation in the chemical laboratory of valuable substances.
Mar. 24,	FREDERIC W. HINRICHS,	The testing of materials.
Apr. 7,	H. S. MINER,	The history of the development of gas lighting (joint meeting with the Chemical Society).
Apr. 28,	E. A. RUMBALL,	Housing conditions in Rochester.
May 12,	D. D. SCOTT,	The mining region of Lake Superior.
May 26,	GEORGE W. KELLOGG,	Photographs of flowers with a hand camera.
Oct. 13,	WILLIAM M. DAVIS,	The lessons of the Colorado Canyon, and how we determine the age of the earth.
Nov. 10,	J. E. WOODLAND,	Experiments with liquids, gases and thermit.
1914.		
Jan. 12,	W. H. WHITE,	Under what conditions is concrete a safe building material?
Jan. 26,	ARTHUR L. SCHOEN,	An electrical process for separating smoke from chimney gas.

DATE	AUTHOR	TITLE
Feb. 9,	HERMAN L. FAIRCHILD,	Views of Mexico.
Feb. 23,	HERMAN L. FAIRCHILD,	Earthquakes.
Mar. 9,	CHARLES C. ZOLLER,	See your own country first, then a bit of Europe.
Mar. 23,	HERMAN L. FAIRCHILD,	Snow crystals as illustration of mineral crystallization.
Apr. 3,	VICTOR J. CHAMBERS,	Dyes and dyeing.
Apr. 27,	CHESTER F. STILES,	Interesting applications of photography.
May 11,	JOHN M. SWAN,	The newer methods of studying diseases of the heart.
May 25,	ELON H. EATON,	The birds of western New York.
Oct. 12,	Several speakers,	Reports on summer experiences.
Oct. 26,	HERMAN L. FAIRCHILD,	The geologic why of Rochester.
Nov. 9,	P. F. TROWBRIDGE,	Some problems of nutrition (joint meeting with the Chemical Society).
Nov. 30,	HOWARD RHODE,	Manufacture of Portland cement.
Dec. 17,	CHARLES F. BINNS,	The history and art of clay working.
1915.		
Jan. 4,	ARTHUR L. DAY,	The volcano Kilauea in action (joint meeting with the Chemical Society).
Jan. 7,	WILLIAM M. DAVIS,	The origin of coral reefs (meeting in participation with the University of Rochester).
Feb. 8,	CHARLES C. ZOLLER,	Europe by color photography.
Feb. 22,	VICTOR J. CHAMBERS,	The utilization of waste materials.
Mar. 8,	HOWARD D. MINCHIN,	Illumination and vision.
Mar. 29,	DOUGLAS W. JOHNSON,	Surface features of western Europe as a factor in the war.
Apr. 26,	HUGH P. BAKER,	Forests and forestry in New York.
May 10,	HERMAN L. FAIRCHILD,	Meteor Crater, Arizona.
May 24,	SCHUYLER BULL,	The structure of the atom and the cause of color.
June 7,	GEORGE H. CHADWICK,	Post-glacial history of the lower Irondequoit Valley (read by title and printed as pages 123–159 of this volume).
June 7,	WILLIAM L. BRAY,	The development of the vegetation of New York State.
Oct. 11,	Several speakers,	Reports on summer experiences.
Nov. 22,	ARTHUR P. COLEMAN,	Ice ages in Africa, Australia and India.
Nov. 29,	CHARLES A. DEWEY,	A sketch of the life of Lewis Henry Morgan.

DATE	AUTHOR	TITLE
Nov. 29,	ALGERNON S. CRAPSEY,	Lewis Henry Morgan, scientist, philosopher and humanist (joint meeting with the Rochester Historical Society).
Dec. 13,	THOMAS C. HOPKINS,	Physiographic and structural features of the Rocky Mountains.
1916.		
Jan. 10,	GEORGE H. CHADWICK,	The land of Rip Van Winkle.
Jan. 24,	Several speakers,	Symposium on the public health.
Feb. 14,	MERTON Y. WILLIAMS,	Interesting phases of the Silurian of Ontario, Canada.
Feb. 28,	CHARLES H. RICHARDSON,	Coal mining with a camera.
Mar. 27,	VICTOR J. CHAMBERS,	The purification of potable water.
Apr. 10,	CHARLES C. ZOLLER,	Autumn and winter views in the colors of nature.
Apr. 24,	HERMAN L. FAIRCHILD,	A trip to Cuba and Panama.
May 8,	H. L. FAIRCHILD, ELLSWORTH P. KILLIP, CHARLES W. DODGE,	Symposium on Jamaica.
May 22,	GUY H. BAILEY,	The call of the out-doors.
Oct. 9,	Several speakers,	Reports on summer experiences.
Nov. 13,	MILROY N. STEWART,	Observations in meteorology.
Nov. 27,	COGSWELL BENTLEY,	Canoeing and camping in Timagami.
Dec. 18,	IRA S. WILE,	The scientific bases of modern medicine.
1917.		
Jan. 8,	SCHUYLER BULL,	Color harmony.
Jan. 22,	CHARLES P. BERKEY,	Geological problems and discoveries of the Catskill Aqueduct.
Feb. 12,	CHARLES C. ZOLLER,	The Adirondacks and Thousand Islands in color.
Feb. 26,	GEORGE A. FRANK,	Shade trees and their insect enemies.
Mar. 12,	Several speakers,	The geology of western New York.
Mar. 26,	HOMER D. HOUSE,	Botanizing with a camera.
Apr. 9,	GEORGE L. ENGLISH,	The wonders and beauties of calcite.
Apr. 23,	ELON H. EATON,	Some rare birds of western New York.
May 28,	JOSEPH G. TAYLOR,	Among the pines of southern New Jersey.
Oct. 22,	DHAN GOPAL MUKERJI,	India under British rule.
Nov. 2,	ROBERT S. BREED,	The milk question.
Nov. 26,	HEINRICH RIES,	Scandinavia, the land of ice and iron.
Dec. 10,	CHARLES H. RICHARDSON,	Picturesque Vermont.

DATE	AUTHOR	TITLE
1918.		
Jan. 14,	ALBERT W. GILES,	Eskers in the vicinity of Rochester, New York (read by title, and printed as pages 161–240 of this volume).
Jan. 28,	E. P. FELT,	Gall-insects and their relation to plants.
Feb. 11,	R. M. RICHTER,	The Indiana limestone industry.
Feb. 25,	GUY A. BAILEY,	Close-ups with the birds.
Mar. 11,	F. C. HAMILTON,	Modern warfare.
Mar. 25,	ROBERT G. COOK,	Aircraft in war.
Apr. 8,	FRANK H. HAMLIN,	Argentina.
Apr. 22,	LATIMER J. WILSON,	Mars and Jupiter through the telescope.
Apr. 29,	WILLIAM A. PARKS,	The northland of Ontario.
May 13,	HERMAN L. FAIRCHILD,	Post-glacial land uplift and the story of the Rochester canyon.
May 27,	JOHN DUNBAR,	Interesting fruits, economic plants and remarkable trees of the world.
June 10,	HERMAN L. FAIRCHILD,	Drumlins, kames and eskers of western New York.
June 24,	FLORENCE BECKWITH,	A botanical visit to Stonewall Gap, Colorado.
June 24,	HERMAN L. FAIRCHILD,	Memoir of Grove Karl Gilbert. (Printed as pages 251–259 of this volume.)
Nov. 11,	Several speakers,	Reports on summer experiences.
Nov. 25,	W. H. JORDAN,	Government aid to agriculture.
Dec. 9,	HERMAN L. FAIRCHILD,	Memoirs of Henry A. Ward and other deceased Fellows of the Academy. (Printed as pages 241–276 of this volume.)
Dec. 9,	GEORGE H. CHADWICK,	Portage stratigraphy of western New York. (To be published in the Bulletin of the Geological Society of America.)

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KENDALL B. CASTLE.....1205 Granite Building
WILMOT CASTLE.....410 Westminster road
GEORGE H. CHADWICK*.....University of Rochester
VICTOR J. CHAMBERS*.....University of Rochester
H. T. CLARK.....Eastman Kodak Co.
LEIGHTON R. CORNMAN, M. D.*.....Hot Lake, Oregon
Mrs. LEIGHTON R. CORNMAN.....Hot Lake, Oregon
H. H. COVELL, M. D.*.....1600 East avenue
ALGERNON S. CRAPSEY.....678 Averill avenue
Miss MARY E. CURTISS.....12 Thayer street
RAYMOND G. DANN.....745 Harvard street
Miss BESSIE DENNIS.....111 Meigs street
Mrs. FRANK H. DENNIS.....5 Castle park
Mrs. JOHN DENNIS.....75 Bellevue drive
ROBERT W. DEVESON.....1176 Main street east
ALVIN H. DEWEY*.....50 Harper street
CHARLES A. DEWEY, M. D.*.....174 Spring street
CHARLES WRIGHT DODGE*.....University of Rochester
MICHAEL DOYLE.....321 Lake avenue
JOHN DUNBAR*.....229 Linden street
PERCY B. DUTTON.....35 Evergreen street
Miss EMMA L. ELLWANGER.....260 Rosedale street
GEORGE L. ENGLISH*.....50 Brighton street
Miss GWENDOLEN ENGLISH.....50 Brighton street
GUSTAV ERBE.....1044 St. Paul street
WILLIAM V. EWERS, M. D.*.....140 Goodman street north
HERMAN L. FAIRCHILD*†.....University of Rochester
EVERSLEY S. FERRIS.....325 Park avenue
G. R. FESSENDEN.....217 Electric avenue
GEORGE T. FISH†.....Mt. Vernon avenue
LESTER FISHER.....402 Granite building
PERCY FREELAND.....383 Oxford street
Miss S. GERTRUDE FULLER.....135 Lake avenue
Mrs. EDWIN P. GARDNER.....Canandaigua, N. Y.
HARRY E. GORDON.....168 Asbury street
ERNEST E. GORSLINE.....Scrantom, Wetmore & Co.
H. B. GRAVES.....78 State street
ELLIOTT M. HAGUE, M. D.....399 Alexander street
WILLIAM B. HALE.....19 Prince street
EDWARD HARRIS.....15 Rochester Savings Bank Building
Mrs. JOSEPHINE P. HEISTER.....72 Plymouth avenue south
CHARLES C. HOPKINS*.....349 Cutler Building

Mrs. Harrie B. Howell.....260 Lenox street
Herbert W. Hoyt, M. D.*.....174 East avenue
Charles F. Hutchison.....Eastman Kodak Co.
Miss Nellie A. Hynes.....121 Genesee street
Ivan C. Jagger*.....University of Rochester
L. E. Jewell.....1560 Lake avenue
Ellsworth P. Killip*.....Balboa Heights, Canal Zone, Panama
Robert W. Lace.....229 East avenue
Mrs. Elizabeth Laird.....453 Plymouth avenue
Fred C. Line.....417 Livingston Building
George C. Leffler.....Bausch & Lomb Optical Co.
Paul LeHardy.....204 Oxford street
Alexander M. Lindsay.....Sibley, Lindsay & Curr Co.
Miss Mary E. Macauley*†.....19 Pinnacle road
Charles W. Markus.....Eastman Kodak Co.
Mrs. Clara B. Marsh.....42 Savannah street
Herbert Marth.....107 Delevan street
W. A. Matson.....23 Lake avenue
Warren A. Matthews*.....56 Lansdale street
C. E. K. Mees*.....Eastman Kodak Co.
John L. Merrell.....106 Edgerton street
William D. Merrell*.....University of Rochester
Carl W. Meyer.....523 Averill avenue
Miss Minnie C. Michel.....67 Saranac street
Mortimer E. Milburn.....15 Kensington street
G. W. Moffet.....118 Gorsline street
Charles S. Moon, D.D. S.....126 Sibley Block
Fred C. Morgan.....189 Clinton avenue north
Mrs. John W. Oothout.....1063 East avenue
Charles H. Palmer.....Genesee Valley Trust Co.
Louis A. Pechstein*.....University of Rochester
Herman K. Phinney*.....University of Rochester
Mrs. Horace G. Pierce.....58 Albemarle street
C. E. Pratt.....938 Granite Building
Miss Stella E. Prongay.....305 Garson avenue
Milton B. Punnett*.....Pittsford, N. Y.
Mrs. Della B. Renwick.....2 Livingston park
G. Willard Rich.....711 Wilder Building
J. L. Roseboom, M. D.*.....672 Main street east
Fred W. Ross*.....1990 Dewey avenue
Dunbar B. Scott.....27 Carthage road
Harry H. Servis.....21 Riverside street
Jacob Schuler.....733 Monroe avenue
Mrs. Mabel Sherry-Hall.....71 Clinton avenue south
Miss Esther Smith.....68 Melville street
Mrs. G. A. Spear.....37 Washington street south

Miss Julia B. Spencer.....11 Greenwood street
Nelson E. Spencer.....809 Wilder Building
Edwin Allen Stebbins.....Clover Street, Brighton
Miss Ida H. Stebbins.....52 Albemarle street
Miss Eleanor Stewart.....126 Plymouth avenue south
Milroy N. Stewart.....Taylor Instrument Companies
Miss Jennie E. Strowger.....855 Main street
Charles R. Sumner, M. D.*.....20 Sibley place
Miss Anna B. Suydam*.....47 Caroline street
John W. Then.....3 Vienna street
Mrs. George T. Thompson.....Canandaigua, N. Y.
Miss Arelyn C. Thurston.....15 Westgate terrace
Miss Marinette E. Thurston.....15 Westgate terrace
Miss Anna Van Aalst.....69 Prince street
Robert C. Vance.....16 Florence street
Mrs. Ethel M. Vanderbergen.....70 Melrose street
Albert J. Walcott.....Bausch & Lomb Optical Co.
Frank A. Ward*.....Ward's Nat. Science Establishment
J. Foster Warner*.....5 Prince street
Herbert A. Weiss.....University of Rochester
George Wendt*.....Mechanics Savings Bank
Mrs. Gertrude Wendt.....Stone road, Barnard
Miss Frances G. West*.....89 Meigs street
Lansing G. Wetmore.....Scrantom, Wetmore & Co.
Douglas M. White*.....1195 North street
Milton E. Woodams.....783 South avenue
Philip H. Yawman.....322 University avenue
Charles C. Zoller*.....100 Delevan street

* Indicates a Fellow.

† Indicates a Life Member

INDEX, VOLUME V.

The papers on plants of Monroe County and Rochester carry their own indexes, and the plant names in the systematic lists are not repeated here. The indexes are on pages 37–38; 120–121.