BROCHURE 3 OF VOL. 3.

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VOLUME INDEX AND CONTENTS.

PROCEEDINGS

OF THE

ROCHESTER ACADEMY OF SCIENCE

VOLUME 3.

EDITED BY
THE PUBLICATION COMMITTEE.

ROCHESTER, N. Y.
PUBLISHED BY THE SOCIETY.
JUNE, 1906.

CONTENTS OF BROCHURE 3 OF VOL. III.

SCIENTIFIC PROCEEDINGS.

ADMINISTRATIVE PROCEEDINGS.

APRIL 28, 1896.

The meeting was held at the Reynolds Library. PRESIDENT H. L. FAIRCHILD in the chair. Thirty persons present.

The following paper was read by title :

WARDITE, A NEW HYDROUS BASIC PHOSPHATE OF ALUMINA.*

BY JOHN M. DAVISON.

[Abstract.]

Analysis :

P_2O_5	34.46
FeO	0.76
CuO	0.04
MgO	2.40
Na_2O	5.98
K_2O	0.24
H_2O	17.87
Al_2O_3 (by dif.)	38.25
	100.

Formula $Al_2(OH)_3PO_4+\frac{1}{2}H_2O$. Named in honor of Prof. Henry A. Ward, of Rochester, N. Y.

It having been announced that this meeting was to be under the direction of the Engineering Section, the President yielded the chair to the Chairman of the Section, MR. ROBERT CARTWRIGHT, who presented the following paper, with blackboard illustrations:

SUB-MARINE CONSTRUCTION — ILLUSTRATING THE METHOD OF WORKING IN COMPRESSED AIR.

MAY 12, 1896.

The meeting was held in Anderson Hall, University of Rochester. PRESIDENT FAIRCHILD in the chair. Ninety persons present.

The Council report, which recommended the election of F. W. Ross and JAMES L. BRUFF as active members, was adopted and the candidates were formally elected.

*This paper is printed in full in the American Journal of Science, Vol. 2, pp. 154-155, August, 1896, and nearly in full in Abstracts for 1897, part 2, p. 50, Chemical Society, England.

The following lecture was given, illustrated by lantern slides, maps and diagrams:

THE ISTHMUS OF PANAMA AND THE PANAMA CANAL.

By Adelbert Cronise.

May 26, 1896.

The meeting was held in Anderson Hall, University of Rochester. President Fairchild in the chair. Sixty persons present.

The President stated that as this was the annual exhibition of the Botanical Section, he would ask the Section to take charge of the meeting. He then introduced Miss Mary E. Macauley, Chairman of the Section, who assumed the chair.

The following report of Professor Charles Wright Dodge on some algae, presented to the Academy by Mr. George W. Rafter, was read by the President in the absence of Professor Dodge:

ALGAE PRESENTED BY MR. RAFTER.

Through the generosity of Mr. George W. Rafter, formerly the Corresponding Secretary of the Society, the Academy has come into the possession of a large and valuable collection of algae, both fresh water and marine forms. The collection consists both of dried specimens mounted on cards, and of specimens in preservative fluids. Of the former there are one hundred eleven (111) specimens, representing seventy-eight (78) named species and varieties of fresh-water algae, seventy (70) of these being from North America and eight (8) from Japan, but represented in North America; there are also ten (10) cards of fresh-water and twenty (20) cards of marine algae, all of which are unnamed.

The specimens in preservative fluid are contained in fifty-one (51) vials, of which twenty-nine (29) contain named species and fifteen (15) named genera, the remainder being duplicates. In the collection are also forty (40) additional vials whose contents have either been ruined by the evaporation of the preservative fluid, or which bear no marks of identification.

This collection contains a very large number of the ordinary forms which any one is likely to meet in his study of the fresh-water species, and as the dried specimens are all from the collection of the Rev. Francis Wolle, one of the foremost American students of this group of plants, the collection is exceedingly valuable for reference.

The gift of Mr. Rafter forms the beginning of a collection of the lower cryptogams, which it is hoped may be rapidly increased until the Academy possesses a complete set of all the plants found within the limits of Monroe county.

An alphabetical list of the species represented is filed with the collection.

On motion of MR. C. C. LANEY, a vote of thanks was extended to MR. RAFTER for his gift.

MISS MARY E. MACAULEY read a paper entitled:

NOTES ON SOME MONTANA PLANTS.

The paper described the differences and resemblances between the Montana flora and our own, and was illustrated by specimens collected during a recent visit to that part of the United States.

MISS FLORENCE BECKWITH read a paper entitled:

WEEDS. *

The paper described a number of pernicious plants which had been introduced into this region, and called attention to the laws of the State in regard to the extermination of the most troublesome. It spoke particularly of the efforts that should be made to prevent the spread of the so-called Russian Thistle, which is increasing so rapidly in the western States that it has already become a great nuisance.

The paper was discussed by Professor Fairchild, Mr. Charles H. Potter and Professor Lattimore.

The remainder of the evening was devoted to the examination of the exhibits of the Section, consisting of the following:

A collection of photographs of trees, by MR. C. C. LANEY;

A photograph of a "Primeval Elm", one of Rochester's most ancient landmarks recently cut down because standing in the way of progress, presented to the Academy by MR. H. C. HEATH, through the kindness of MR. H. K. PHINNEY;

* This paper was published, in part, in the Rochester Democrat and Chronicle, May 27, 1896; printed in full in Vick's Magazine, Sept., 1905.

A collection of cultivated plants from the parks by MR. JOHN DUNBAR ;

A collection of native plants of Monroe County and vicinity, comprising many rare and interesting species.

JUNE 9, 1896.

The meeting was held at the Reynolds Library, PRESIDENT FAIRCHILD in the chair. Sixty persons present.

The council report was adopted which recommended:

(1) The payment of certain bills. (2) The election of MRS. R. P. GRAY as an active member.

The Librarian reported that 400 volumes and pamphlets had been added to the library since the report at the annual meeting in January, and gave the titles of some of the more important contributions.

The President asked the members for an expression of their wishes as to the place of meeting. A majority preferred to continue the meetings at the Reynolds Library.

Upon motion of MR. EMIL KUICHLING, the Academy gave a vote of thanks to the Trustees of the Reynolds Library for granting to the Society the use of the lecture hall.

PROFESSOR W. C. MOREY, in behalf of the Trustees, responded in a few remarks, assuring the Society that it was very welcome to continue to hold its meetings at the Library.

The following memorial was read:

MEMORIAL OF SYLVENUS A. ELLIS.

BY JOSEPH E. PUTNAM.

In the death of Dr. Ellis, on March 23, 1896, this Academy has lost one of its oldest members, and it is fitting that some formal notice of his life and work should be taken at this time. It is with a feeling of diffidence that I undertake the task, though it is a labor of love. Dr. Ellis was to me, what he was to many other young men, a wise counselor and staunch friend, but in addition he was to me like a father in all respects save blood relationship.

He was born at Tyrone, Steuben County, N. Y., October 28, 1829. He went to school and shared the adventures and mishaps common to the boys until he commenced teaching in Nunda at the age of nineteen. For four years he taught at the Nunda Academy, and during this time prepared himself for college. He entered the University of Rochester in 1852, and graduated in 1855, with the degree of Bachelor of Arts. Many times he has related the interesting events in those early years of the University, when it was located on Buffalo Street, now West Main. He seems to have been actively interested in out-of-door sports, which probably helped to preserve the vitality that enabled him, though of poor health in later years, to attain an age of 66 years, and be active almost to the end. In college he was a member of the Alpha Delta Phi fraternity, and was elected to the honorary Phi Beta Kappa Society.

Mr. Ellis engaged in several business enterprises, among which was that of bookseller, in the firm of Adams & Ellis, at 40 Buffalo Street, where now stands the Elwood Block. In 1869 he was made Superintendent of Rochester Public Schools, which position he held until 1876. He then became a teacher in the Western New York Institute for Deaf Mutes, where he remained until 1882. Again chosen Superintendent of Schools, he held the position for ten years, 1882 to 1893.

In 1884 he received from the Regents of the University of the State of New York the degree of Doctor of Philosophy.

From this brief description it will be seen that the work of Dr. Ellis was chiefly as an educator. He had a broad conception of the true education. His interest in science was stimulated by the educational work for the young in which he was engaged. He was one of the original members of this Academy, having joined the parent society, the old Microscopical Society, at its third meeting, March 10, 1879. He was President of this Academy in 1888. He devoted much time to the work of the Microscopical Section, and became an enthusiast in Entomology. He was much interested in the crusade by the school children against the enemy of our shade trees, the tussock moth.

His connection with educational work through many years has left its imprint on the character of thousands of Rochester's men and women, the impression of a firm, gentle, pure nature which upheld and exemplified the highest ideals of true manhood.

The President gave a lecture, illustrated with maps, drawings and lantern views, entitled :

THE GEOLOGY OF IRONDEQUOIT BAY.

By Herman L. Fairchild.

[Abstract.]

This body of water lies three miles northeast of the city of Rochester and four miles east of the lowest section of the Genesee river. The geography of the bay and its surroundings is shown in the accompanying map, plate 3.

The bay of Irondequoit is now practically a distinct lake, about four miles long and three-fourths mile wide, since the wave and current action along the Ontario shore, aided by the filling for the Rome, Watertown and Ogdensburg Railroad, has closed the original open mouth of the bay by a heavy embankment or bar, leaving only a narrow passage for escape of the surplus Irondequoit water.

The Irondequoit valley is about two miles wide at the top of the cross-section, and as a traceable valley extends at least 15 miles southward from Lake Ontario to near the village of Fishers.

The depth of the valley to the rock is unknown, but water of the bay is 78 feet deep. The large dimensions indicate a preglacial valley of a large stream, which before the glacial period flowed north to join an ancient Ontarian river. It is believed that there exists no other equally large trench in the rock strata between Niagara river and Sodus bay. The inference follows that this depression is a deserted section of the ancient preglacial valley of the Genesee river, which from its present mouth at Charlotte to several miles southwest of Rochester is in a new or postglacial canyon. Apparently a section of the ancient valley, having an easterly trend, somewhat oblique to the ice movement, has been buried by drift and wholly obscured, like another section of the same river valley between Portageville and Nunda.*

In the same manner that the river was forced by drift obstruction into a new rock channel below Portageville, so in the Rochester section the river has been thrown out of its old valley somewhere in the vicinity of Avon. The Irondequoit valley is the only wide break in the rock strata forming the south side of the Ontario basin between

*See Bull. Geol. Soc. Am., Vol. 7, pp. 438-442.

Niagara river and Sodus bay which can compare in dimensions, or cross-section, with the Genesee valley at Geneseo. A very rough estimate of the gradient gives a result not inconsistent with the above idea. Taking the altitude of the Genesee Forks as 1,624 feet above tide, the valley at the mouth of Canaseraga creek below Mt. Morris as 574 feet altitude, and the bottom of Irondequoit bay as 169 feet, we find the upper section to have a direct-line grade of about 17 feet per mile, and the lower section about 10 feet per mile. But to establish the connection or continuity of the Genesee and the Irondequoit valleys will require a considerable number of well borings.

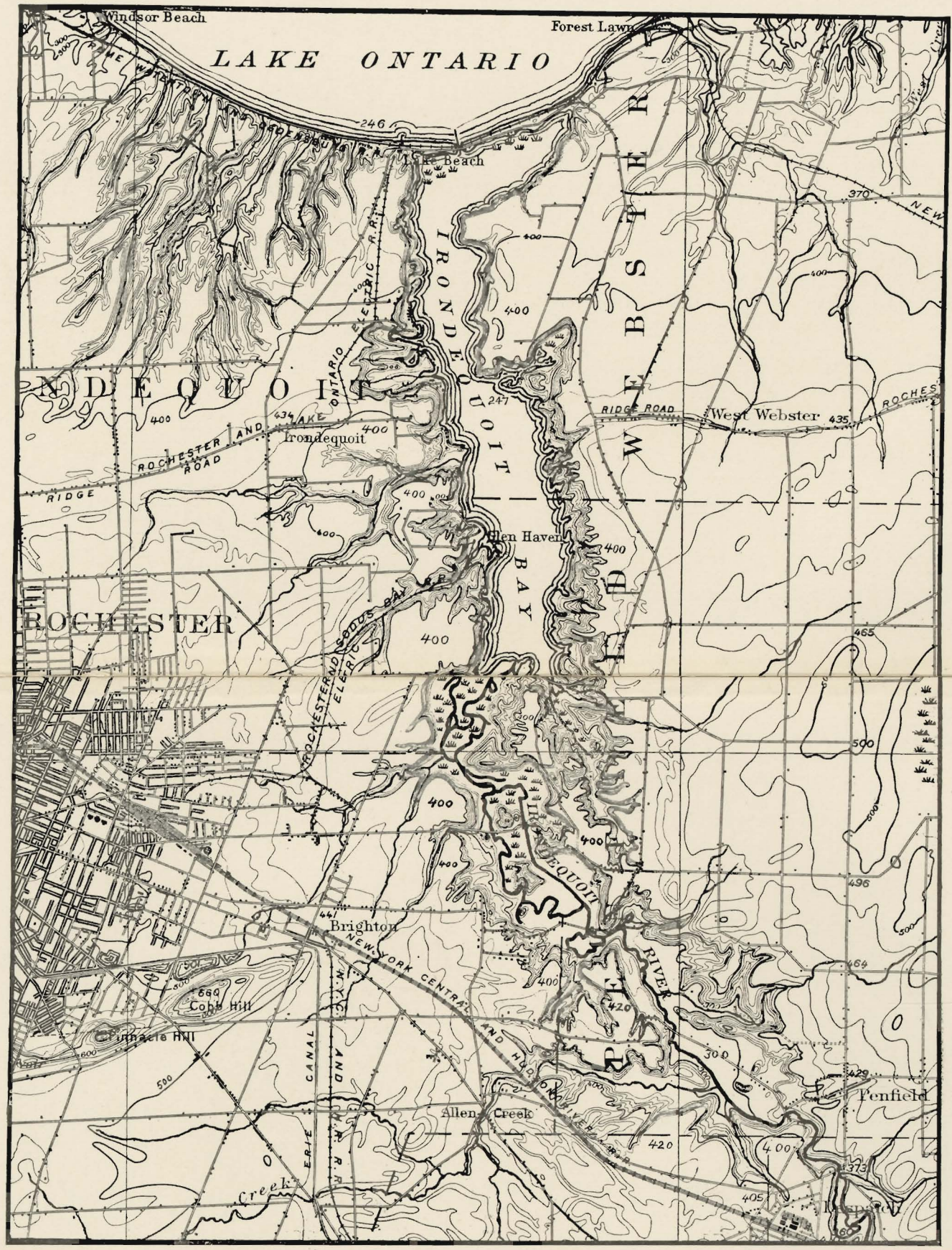
The glacier left a heavy kame-moraine in the southern part of the visible Irondequoit valley, or between Pittsford and Fishers, above which the valley is filled and lost. As the ice front receded deep glacial waters were held between it and the high ground upon the south, and these waters continued the work of filling the valley. Lake Warren, with its surface at about 880 feet altitude, helped to bury the southernmost section. Lake Dana, which represents a long pause in the subsiding waters, with its height about 700 feet, also performed its part of the work. Later came Lake Iroquois, which as a gulf occupied Irondequoit valley as far south as Pittsford, with hight in the gulf of 430-435 feet. (Altitude at the "Ridge Road" 440 feet.)

In this gulf of Iroquois, which probably existed several thousand years, the process of filling with silts and sand by stream-wash proceeded so far as to entirely fill the gulf, as far north as the parallel of Rochester, to within 30 or 35 feet of the water surface. Doubtless the glacial drift (moraine, kame and esker) which the ice had left in the valley lessened the task of the waters, for such deposits are found beneath the lake silts. In other words, the delta deposits of the Irondequoit river and its tributaries, like Allen creek, completed the filling of a large stretch of the valley which the glacier had only partially filled. This lake deposit was mostly subaqueous, as the remnants are only about 400 feet altitude and chiefly fine sandy silts, as if spread out by the gentle agitation of lake waters. The Rochester sheet (plate 3) shows very clearly this plain at 400 feet all about the Irondequoit valley, and the remnants of it are left as tables or "sugar-loaves" in the midst of the valley. This silt plain slopes gently northward, being somewhat under 400 feet at the Ridge Road, and about 420 feet at Allen creek, giving a northward slope of

about three feet per mile. But this part of the continent has been tilted since the Glacial Period, or differentially uplifted in a northerly direction, at the rate of about three feet per mile, which makes the original slope of the plain at least six feet per mile.

When the St. Lawrence valley was slowly opened, by the removal of the ice blockade north of the Adirondacks, lake Iroquois, which had its outlet at Rome to the Mohawk valley, was slowly drained down to the ocean level. As the Thousand Islands region was then about 150 feet below sea level, the slow tilting of the great land area has now raised the Thousand Islands about 400 feet, so that Lake Ontario has an elevation of 246 feet above tide. With the falling of the waters in the Irondequoit valley river action again came into play and a large part of the Iroquois lake deposits have been eroded and swept down into the present lake. The filling process is simply shifted again to a lower level. The four definite planes of lake action have been at 880 feet (Warren), 700 feet (Dana), 440 feet (Iroquois) and 246 feet (Ontario).

The Irondequoit topography is the most singular and interesting of any area in the Rochester region. It is the product of atmospheric and stream erosion acting on horizontally bedded lake-silts overlying glacial drift. The wide-spread level, mesa-like stretches are constructional, being remnants of the sublacustrine Iroquois plain, while the gullies and valleys (and the hills as a negative element) are erosional. The Irondequoit district offers an unusually good field for geographic and geologic study. The horizontal rocks, sandstone, shale and limestone, which constitute the ancient valley walls are a record of the far ancient time when all the region was beneath oceanic waters. The broad valley represents the erosional work of an ancient river (supposedly the preglacial Genesee) through many millions of years of later Paleozoic, Mesozoic and Cenozoic time. The varied features of the upland surfaces and the buried deposits in the valley are the effects of the Pleistocene glacier. The horizontally bedded sands and clays and the widely extended silt plain at or near 400 feet elevation are the constructional work of the glacial lake waters that were held in front of the receding ice sheet. The present work of lake waters may be seen in active operation, as wave erosion along the Ontario and Irondequoit shores ; wave construction in the great bar which now cuts the bay off from the larger lake ; and the evident filling of the bay at either end by detrital materials from the land



IRONDEQUOIT BAY AND VICINITY.

The map is reproduced, with slight reduction, from portions of the Rochester and Macedon sheets of the New York State topographic map. The scale is approximately an inch to the mile. Numerals show altitudes above sea level. The fine lines are horizontal contours with vertical interval of 20 feet.

H. L. FAIRCHILD.

wash and by peat deposits of vegetal accumulation. In addition to these activities and records of the past agents the Irondequoit river affords an excellent illustration of stream work in its several elements of erosion, transportation, deposition, meandering and leveé-building.

OCTOBER 13, 1896.

The meeting was held at the Reynolds Library. PRESIDENT FAIRCHILD in the chair. Fifteen persons present.

MR. PRESTON showed a specimen of agate from India, containing a large cavity filled with water and air.

PROFESSOR FAIRCHILD spoke of his summer's work on the shoreline of Lake Warren.

H. L. PRESTON presented a paper on :

IMITATIVE FORMS IN ROCKS PRODUCED BY EROSION.

The paper was illustrated by specimens of rocks, several of which had assumed fantastic shapes, imitative of anatomical forms.

OCTOBER 27, 1896.

The meeting was held at the Reynolds Library. VICE-PRESIDENT J. M. DAVISON in the chair. Thirty-eight persons present.

F. W. WARNER presented a paper entitled :

BIOMETRY, A DISCUSSION OF LONGEVITY.

The paper was discussed by Professor Dodge, Dr. Roseboom, Dr. Goler, Mr. Davison and Mr. Keeler.

NOVEMBER 10, 1896.

The meeting was held at the Reynolds Library. PRESIDENT FAIRCHILD in the chair. Forty persons present.

MR. GEORGE HEBARD and MRS. MARIE SHIEL were elected active members of the society.

The Council recommended the election of SENOR ANTONIO GORDON, President of the Royal Academy of Sciences of Havana,

Cuba, as a corresponding member of the Academy. Under the rules the election was put over for one month.

The Secretary presented a series of resolutions adopted by the Joint Commission of Scientific Societies of Washington, D. C., recommending the passage of a bill by Congress, providing for the appointment of a Director in Chief of the Scientific Division in the Department of Agriculture.

In moving the endorsement of the resolution, PROFESSOR CHARLES WRIGHT DODGE explained the advantages which would result from the appointment of such a Director, who would not be subject to the changes incident to the changing of administrations. The resolutions were endorsed.

A communication requesting approval of resolutions of Joint Commission of the Scientific Societies of Washington, D. C., against the antivivisection bill (Senate Bill 1552), was read by the Secretary and discussed at length by Dr. Goler, President Fairchild, Professor Dodge and Mr. J. E. Putnam. The communication was laid on the table for a month.

PROFESSOR HENRY E. LAWRENCE, of the University of Rochester, read a paper entitled :

THE PRESENT SCIENTIFIC STATUS OF THE ROENTGEN RADIATION.

The paper was illustrated by physical experiments.

NOVEMBER 24, 1896.

The meeting was held at the Reynolds Library. PRESIDENT FAIRCHILD in the chair. Forty-nine persons present.

The President showed a series of three colored pictures published by the Department of Agriculture, just received by the society, illustrating the effects of erosion from forest destruction, and methods of reclaiming and preserving soils.

PROFESSOR CHARLES WRIGHT DODGE presented a paper on

THE NATURAL CONDITIONS OF EXISTENCE.

DECEMBER 1, 1896.

A special meeting was held in the Physical Laboratory of the University of Rochester. PRESIDENT FAIRCHILD in the chair. Forty-five persons present.

MR. E. L. ELLIOTT, of Pittsburg, Pa., gave an illustrated lecture upon the

UTILIZATION OF ARTIFICIAL LIGHT, AS APPLIED TO PUBLIC AND PRIVATE LIGHTING.

The paper was illustrated by various forms and kinds of shades and globes.

DECEMBER 8, 1896.

The meeting was called to order by the President at the Reynolds Library, but on account of the very stormy weather and small attendance it was voted to adjourn to December 15.

DECEMBER 15, 1896.

Adjourned meeting held at the Reynolds Library. PRESIDENT FAIRCHILD in the chair. Thirty-four persons present.

W. J. CRAIG and A. T. RINKER were elected active members of the society.

The communication on antivivisection was laid on the table until the next meeting.

A specimen of weathered boulder was exhibited by MR. ELON HUNTINGTON.

MR. PRESTON showed some smoothly polished quartz pebbles found in a crevasse in a limestone quarry in Missouri, sixty feet below the surface.

A paper entitled

CONCRETIONARY FORMS IN ROCK STRUCTURE

was read by MR. H. L. PRESTON. The paper was illustrated by a large number of interesting specimens.

JANUARY 12, 1897.

Annual meeting held at the Reynolds Library. PRESIDENT FAIRCHILD in the chair. Twenty-four persons present.

The annual reports of the officers were presented, as follows:

SECRETARY'S REPORT.

The Secretary, PROFESSOR A. L. BAKER, reported seventeen meetings held during the year with an average attendance of forty-five; new members elected, thirteen; papers read, twenty-one, classified as follows: Geology and Mineralogy, five; Botany, three; Physics, including Engineering, seven; miscellaneous, six.

CORRESPONDING SECRETARY'S REPORT.

The Corresponding Secretary, PROFESSOR C. W. DODGE, reported that three new Corresponding Members had been added to the list, making the total number thirty-six.

LIBRARIAN'S REPORT.

The Librarian, MISS FLORENCE BECKWITH, reported that 508 volumes and separate publications had been added to the library during the year 1896. Thirty-two societies had been added to the exchange list during the year and fifteen had been dropped, making the total number now on the list 466.

REPORT OF THE BOTANICAL SECTION.

The report of the Botanical Section was read by the Recorder, MRS. J. H. MCGUIRE, as follows:

The officers of the Section are: MISS MARY E. MACAULEY, Chairman; MISS FLORENCE BECKWITH, Vice-Chairman; MRS. J. H. MCGUIRE, Recorder.

Since the removal of the Academy from the Reynolds Arcade Building eight years ago, the Section has met at the residence of Mr. William Streeter, No. 14 Scio St. The Section finds there every appliance for botanical and microscopical study in Mr. Streeter's microscopes, illustrated works on algae and fine reference library. The section is greatly indebted to Mr. and Mrs. Streeter for these privileges, and take this opportunity of publicly acknowledging their kindness and hospitality, and the invaluable assistance they have constantly rendered in botanical and microscopical research.

Twenty-four regular meetings were held during the year, and the Section took charge of a public meeting of the Academy held at the University of Rochester on May 26, at which a large number of rare plants were shown.

As in past years, the members of the Section have largely devoted themselves to the collection and identification of the plants of this vicinity, with the purpose of making as complete a record of the flora of the region as possible, and at the same time adding to the herbarium of the Academy.

January 3, 1896, a communication in regard to a historic elm on Main street was read, as follows:

AN INTERESTING ELM.

By H. K. Phinney.

Probably the progress of building will, before long, remove what is, I doubt not, almost the largest and oldest elm tree in Rochester, and certainly one of the few remaining primeval forest trees within the city limits. Before it falls it seems proper to call the attention of the Botanical Section to some points of interest regarding it.

The tree stands in a vacant lot on the south side of East Main street, just east of Alexander street. It measures as follows: at surface of ground, the lot having been considerably filled up, 18 feet, 6 inches; at three to four feet above ground, above the flare of the root buttresses, 14 feet, 3 inches; at 7 feet above the ground, 13 feet, 9 inches. The spread of the branches is more remarkable than the girth of the trunk. This is, in a line nearly east and west, 98 feet, and in a line northeast to southwest, 100 feet, 6 inches. In other directions it is perhaps two-thirds as great, neighboring trees having hindered growth. The present height of the tree is 60 feet, but it was formerly much greater. The head of the trunk met some catastrophe years ago, and I am informed by Mr. H. C. Heath, who lives in the first house on the east, that within the time of his residence there, twenty odd years, at least 20 feet of the trunk has fallen down, and that the fallen portion was from a foot to fifteen inches in diameter. If it was a foot in diameter at 80 feet hight, the highest twigs borne above such a trunk must have considerably exceeded 100 feet in height. This renders it quite certain that the tree attained its growth vertically while still surrounded by the close forest; that the head was broken down by

lightning or a storm, and that the clearing of the land about it gave opportunity for the lower branches to grow upward, and for the lowest twigs upon the trunk to attain their magnificent horizontal growth.

The location of the tree was favorable to its growth. It stood just above a spring in the bank of the stream which, rising somewhere near Monroe avenue, Savannah and Manhattan streets, flowed northeastward, crossing Main street between Alexander street and Prince street, and continued to the bay in what is now called Densmore creek. The channel is not entirely filled up, but can be traced through the lot in question and at other points. A basswood and two beeches also stand on its banks in this lot, but these may be only second growth seedlings. The basswood is about 60 feet high, the beeches less, but one of these spreads nearly 60 feet horizontally, though it has lost all of one side of the lower part of its trunk, and has a hole through the remainder, round the edges of which hole the growing bark has curled in a curious fashion. Mr. Heath, judging from the rate of growth of elms which he has watched for forty years, estimates the age of the big elm at over 150 years.

Mr. L. C. Langie has bought the lot on which the big elm stands and proposes to build a house the coming spring. The tree is where the house must stand, and it seems hopeless to try to save it, though it still gives signs of vigorous life, having, so Mr. Heath judges, added three inches to its girth during the past year. It is to be hoped that photographs* may be taken of the tree before it is cut down, that its appearance, at least, may be preserved.

I have spoken of this as about the largest elm in Rochester. There is one in Genesee Valley Park that is a little greater in girth and probably taller, having had no accident befall it, so far as appears; but I know of no other tree equalling the East Main street tree in spread of branches.

There is another point of interest concerning this tree, historical, however, instead of botanical. Just beside it passed the old Indian trail from the head of the bay, where the float bridge now is, to the ford across the river just above the present site of Court street bridge. This trail remained the regular route for the white man's travel from the bay to the city until the farms around were cut up into streets and building lots—a time within the memory of many men not yet aged.

*A photograph of this primeval forest tree was presented to the Botanical Section by Mr. H. C. Heath, May 26, 1896.

If the Park Commission, the Forestry Association and the Historical Society could preserve this lot in its early appearance, the old tree might yet see many seasons of growth and beauty.*

At the meeting of June 22, 1896, the committee on the publication of "A List of the Plants of Monroe County, New York, and Adjacent Territory," consisting of Miss Florence Beckwith, Miss Mary E. Macauley, and Mr. Joseph B. Fuller, announced the completion of their work. Copies of the list were distributed among the members of the Section, and much satisfaction was expressed with the work and the admirable manner in which it had been accomplished. A vote of thanks was given to the committee, and also to Professor H. L. Fairchild for his invaluable assistance and encouragement, from the first inception of the work to its completion.

Mr. J. B. Fuller, Dr. C. M. Booth, and Mr. M. S. Baxter botanized systematically and thoroughly in certain localities, particularly along the railroads, and, as a result, a large number of plants new to this vicinity were recorded between the time of the publication of the List of Plants, in June, and the close of the year. Among the most noted of these newly introduced plants is the Russian Thistle, *Salsola Kali* L. var. *Tragus* Moq. This plant, which has become so great a nuisance in the West, had not been reported in this part of the State, but it was thought it would probably appear during the summer, and particularly thorough search was made for it, resulting in its first discovery by Dr. C. M. Booth along the track of the New York Central railroad.

Other plants, never before reported in this vicinity, are as follows: *Kochia scoparia* Schrad.; *Oxybaphus hirsutus* Sweet; *Cycloloma platyphyllum* Moquin.; *Helianthus maximiliana* L.; *Helianthus petiolaris* Nutt; *Helianthus rigidus* Desf.; *Solanum Carolinense* L.; *Wolffia brasilensis* Weddell; *Ononis repens* L.; *Plantago patagonica* Jacq. var. *aristata* Gray; *Verbena bracteosa* Michx.; *Mollugo verticillata* L.; *Ambrosia trifida* L. var. *integrifolia* Torr. and Gray; *Selaginella rupestris* Spring; *Pellœa atropurpurea* Link.; *Leontodon autumnalis* L.; *Hosackia purshiana* Benth. (a single plant); *Vicia hirsuta* Koch.; *Œnothera sinuata* L.; *Diodia teres* Walt. (one plant); *Ambrosia psilostachya* DC.; *Physalis philadelphica* Lam.; *Linaria Cymbalaria* Mill. (a single plant); *Chenopodium ambrosioides* L.;

*This tree was cut down a few days after this communication was read.

Chenopodium glaucum L.; *Panicum miliaceum* L.; *Helianthus annuus* L. (introduced western form).

New stations in Monroe County or adjacent territory, were reported for the following rare and infrequent plants :*

Plantago patagonica Jacq.; *Equisetum scirpoides* Michx.; *Carex umbellata* Schk.; *Pyrus arbutifolia* L.f.; *Cardamine pratensis* L.; *Ophioglossum vulgatum* L.; *Valeriana sylvatica* Banks; *Calopogon pulchellus* R. Br.; *Eragrostis major* Host.; *Polymnia canadensis* L.; *Houstonia purpurea* L.; *Asplenium ebeneum* Ait.; *Desmodium ciliare* DC.; *Pogonia pendula* Lindl.; *Bartonia tenella* Muhl.; *Aster acuminatus* Michx.; *Solidago ohioensis* Riddell; *Poterium Canadense* Benth. and Hook.; *Pycnanthemum lanceolatum* Pursh.; *Euonymus atropurpureus* Jacq.; *Cassandra calyculata* Don.; *Picea nigra* Link.; *Salix myrtilloides* L.; *Viburnum cassinoides* L.; *Habenaria lacera* R. Br.; *Equisetum palustre* L.; *Arabis perfoliata* Lam.; *Sonchus arvensis* L.; *Tussilago farfara* L.; *Chrysanthemum balsamita* L. var. *tanacetoides* Boiss.; *Asperula orientalis* Boies. & Hohen.

A specimen of *Aster lævis* having white rays was found at the University avenue dugway ; Gray's Botany reports a similar specimen having been found at Fort Edward, Saratoga County, N. Y., some years since.

Report of the Engineering Section.

The Report of the Engineering Section, Mr. John F. Skinner, Recorder, was read by Mr. E. A. Fisher, as follows :

The Executive Committee of the Section of Engineering beg leave to submit the following annual report.

During the past year fifteen meetings have been held, eight at the City Engineer's office and seven at the Reynolds Library. The average attendance has been thirteen. Four new members have been admitted, as follows : March 16, Geo. F. Chisom ; John H. Finney ; Daniel D. Tompkins. Nov. 16, George A. Hebard.

At the Annual Meeting, January 21, 1896, the following officers were elected : Robert Cartwright, Chairman ; E. A. Fisher, 1st Vice-Chairman ; Wm. F. Jordan, 2nd Vice-Chairman ; J. Y. McClintock, Recorder.

The Chairman and two Vice-Chairmen constitute the Executive Committee.

* The facts concerning the discovery of new species of plants and of new stations will be given in a list supplementary to the Plants of Monroe County, printed in this volume, pages 1-150.

At the same meeting the following amendment to the Rules of the Section was adopted :

"The Annual Election of officers shall be held upon the third Monday of January in each year."

At the meeting of June 16, the resignation of J. Y. McClintock as Recorder of the Section was presented.

Upon motion of Mr. Putnam, seconded by Mr. Thompson, it was resolved : "That Mr. McClintock's resignation be accepted and a vote of thanks tendered him for his services as Recorder."

Upon motion of Mr. Brown, seconded by Mr. Thompson, it was resolved : "That Mr. John F. Skinner be Recorder of the Section for the remainder of the year."

During the year the following papers have been read before the Section :

"Repairs to Asphalt Pavement," H. T. Powell.

"Electrolysis of Water Pipes," E. Kuichling.

"Electric Towage on the Erie Canal," C. N. Pratt.

"Modern Electric Railway Construction," LeGrand Brown.

"Street Railway Tracks," Houston Barnard.

"Mechanical Preservation of Railroad Ties,"
Clarence R. Neher.

"The Theory of Weir Measurements," John F. Skinner.

"Lot Lines," Wm. R. Storey.

"A Proposed Regulation as to the Acceptance of Private Streets by a City," Wm. J. Stewart.

"Engineering Practice in Florida, with Special Reference to the Preservation of Timber," A. J. Grant.

On July 18, fifteen members of the Section, and eighteen visitors, made an excursion to Portage over the Western New York and Pennsylvania Railroad.

The following named members attended : Messrs. Barnard, Bristow, Brotsch, Brown, Cartwright, Fairchild, Fisher, Hotchkin, Jordan, Kenyon, Munger, Neher, Putnam, Skinner and Thompson. Among the visitors were a number of ladies ; also Messrs. Kenyon and Hebard from the City Engineer's office ; Mr. A. J. Grant, formerly Superintendent of the Sanford & St. Petersburg Railroad, Florida, and Prof. C. D. Marx, who occupies the Chair of Civil Engineering at the Leland Stanford Jr. University. The Portage

Falls and the Erie Railway Bridge were visited; the sites of the aqueduct and the proposed tunnel were viewed, and the "Slide," which has constantly changed the alignment of the railroad, excited the interest of the members of the Section. In the course of the day, the Chairman, Mr. Cartwright, stated that Congressman Brewster had asked him the sentiment of the Engineers in regard to the adoption of the Metric System. The question was put to vote with a majority of sixteen to one in favor of the new system.

An excursion to Niagara Falls was arranged for October 17, in which the members of the Academy were invited to join; but on account of the small prospective attendance, and the inclemency of the weather, the Committee having the matter in charge decided to abandon it.

The Committee recommends for the coming year that the meetings of the Section be held once, instead of twice, each month, and possibly on some night more convenient than Monday.

Respectfully submitted,

ROBERT CARTWRIGHT,
EDWIN A. FISHER,
WM. F. JORDAN,
Executive Committee.

Rochester, N. Y., January 12, 1897.

BOTANICAL CURATOR'S REPORT.

MR. J. B. FULLER, Curator in Botany, reported that during the year 1896, contributions had been made to the herbarium of the Academy as follows:

By Mr. William Streeter, the valuable collection of Mrs. Mary E. Streeter, consisting of 1,360 specimens from various parts of the United States and elsewhere, embracing 62 species of Trifolium, 208 Ferns, and many other plants not hitherto represented in our herbarium.

By Miss Mary E. Macauley, 130 specimens of Montana plants collected and mounted by herself.

By E. J. Hill, of Chicago, 45 specimens, embracing *Eleocharis capitata* R. Br., *Rhyncospora capillacea* Torr. var. *leviseta* Hill, *Lechea Leggettii* Britton & Brown, and *L. minor* L. from Lake

County, Indiana ; *Lechea stricta* Leggett, from Englewood (Chicago), and 17 specimens of *Potamogeton*, mostly collected by him in Hemlock, Canadice, Honeoye and Silver lakes, in this state.

By Mr. George W. Rafter, 113 mounted specimens of fresh water algae.*

The number of mounted specimens now in the herbarium is 4,600 ; of unmounted, 7,400 ; making a total of 12,000, being a gain of 2,400 during the year, of which over 700 were collected by members of the Botanical Section.

The Curator in Biology, Professor Charles Wright Dodge, spoke of the gift of fresh water algae by Mr. George W. Rafter.

Informal reports were made by Mr. John Walton, Curator in Conchology, and Mr. C. J. Sarle, Curator in Geology.

The communication from the Joint Commission of the Scientific Societies of Washington, D. C., in reference to Senate Bill 1552, against vivisection, previously laid over, was taken up, and after some discussion the resolution of the committee was endorsed.

The following officers were elected for the ensuing year :

President, HERMAN L. FAIRCHILD.
First Vice-President, J. M. DAVISON.
Second Vice-President, J. EUGENE WHITNEY.
Secretary, ARTHUR LATHAM BAKER.
Corresponding Secretary, CHARLES WRIGHT DODGE.
Treasurer, F. W. WARNER.
Librarian, MISS FLORENCE BECKWITH.
Councillors, { J. L. ROSEBOOM, until 1900.
MISS EVELINE P. BALLENTINE, until 1900.

A communication in reference to the Pasteur Monument fund was presented, and Professor Charles Wright Dodge was appointed to represent the Academy on the National Committee for this fund.

JANUARY 27, 1897.

The meeting was held at the Reynolds Library. PRESIDENT FAIRCHILD in the chair. Fourteen persons present.

*For description see Vol. III, page 232, of Proceedings.

DR. W. H. JORDAN, of the State Agricultural Experiment Station at Geneva, N. Y., spoke on the subject of

EXPERIMENT STATIONS AND THEIR WORK.

FEBRUARY 9, 1897.

The meeting was held at Anderson Hall, University of Rochester. PRESIDENT FAIRCHILD in the chair. About 300 persons present.

Notice was given of an amendment to Article VII of the Constitution, as follows: After the clause "shall consist of the officers of the Academy," insert the words "and the Chairmen and Recorders of the active sections."

PROFESSOR HENRY A. WARD gave an informal description of his recent journey to the Eastern Hemisphere, including Australasia, recounting many features of scientific interest.

FEBRUARY 23, 1897.

The meeting was held at Anderson Hall, University of Rochester. PRESIDENT FAIRCHILD in the chair. About 150 persons present.

The President spoke of the loss to the Society in the death of one of its members, Mrs. Ruth Siddons. MISS BECKWITH made some brief remarks on the studies and work of Mrs. Siddons, and of her interest in science.

MR. CHARLES H. WARD exhibited and described a human skeleton mounted with artificial muscles. This preparation, original with Mr. Ward, represented accurately all the muscles of locomotion, and it was dissected before the audience.

MR. WARD also exhibited a number of skulls and parts of skeletons of aborigines of Australia, New Zealand, New Hebrides and Samoa.

MARCH 9, 1897.

The meeting was held at Anderson Hall. VICE-PRESIDENT J. M. DAVISON in the chair. About 75 persons present.

Miss Kate Andrews, Mr. E. L. Potter and Mr. George H. Chadwick were elected to active membership.

Mr. Elbert L. Potter, assistant to Professor Henry A. Ward, upon his recent Australian trip, gave a lecture entitled :

COLLECTING ON THE CORAL REEFS OF AUSTRALIA.

The lecture was illustrated by lantern views and some fine specimens of coral were exhibited.

April 13, 1897.

The meeting was held at the Reynolds Library. President Fairchild in the chair. About one hundred ten persons present.

Dr. S. H. Linn gave a lecture on

RUSSIA.

The lecture was illustrated by a large number of lantern views.

April 27, 1897.

The meeting was held at the Reynolds Library. President Fairchild in the chair. One hundred ten persons present.

Mr. John Walton showed colored drawings of a mollusc, new to this locality, *Vivipara contectoides* Binney, also a drawing of *Planorbis hirsuta* (?), both found in the canal.

Mr. John S. Wright exhibited a series of lantern views from photographs taken by himself, illustrating

SCENERY AND LIFE IN GREECE, THESSALY, CONSTANTINOPLE AND SYRIA.

May 11, 1897.

The meeting was held at the Reynolds Library, the President in the chair, fifty-five persons present.

Mrs. Alfred Burrows and Mr. E. Howard Eaton were elected to active membership.

MR. E. L. POTTER showed specimens of a marine worm, *Palolo viridis*, from Samoa, used as food by the natives.

MR. J. G. D'OLIER showed a skull dug up near Honeoye Falls, accompanied by a deposit of seed ; also part of another skull, deformed, with which were found a necklace of claws and a pipe, which he also exhibited.

MR. JOHN WALTON made further remarks concerning the shells noted at the preceding meeting.

PROFESSOR H. L. FAIRCHILD presented a paper entitled :

RECENT STUDIES OF GLACIAL LAKES.

The paper described the phenomena of the later glacial waters of New York state, specially the remarkable outlet channels in the Syracuse region. The matter is printed in the Bulletin of the Geological Society of America, Volume 10, 1899, pages 27-68 ; also in the American Journal of Science, volume VII., pages 249-263; also in the Twentieth Annual Report of the New York State Geologist, 1900, pages 104-139.

MAY 25, 1897.

The meeting was held at Anderson Hall. PRESIDENT FAIRCHILD in the chair, and about forty-five persons present.

In the absence of the expected lecturer, WOODS HUTCHINSON, M. D., of Buffalo, N. Y., PROFESSOR CHARLES WRIGHT DODGE gave a lecture upon the

NATURAL HISTORY OF LEAVES.

The lecture was illustrated by lantern views.

JUNE 8, 1897.

The meeting was held in Anderson Hall. PRESIDENT FAIRCHILD in the chair; about 100 persons present.

MR. J. G. GLEN and MR. HARRY WOODWORTH were elected to active membership.

PRESIDENT FAIRCHILD stated that this was the annual public meeting of the Botanical Section, and introduced Miss Florence Beckwith, Chairman of the Section, who took the chair.

MISS BECKWITH stated that instead of making a general exhibit of wild flowers, the Section had mostly confined its efforts for this meeting to obtaining orchids to illustrate the paper of Mr. Walton. Among the orchids exhibited were *Orchis spectabilis* L.; *Cypripedium candidum* Muhl; *C. parviflorum* Salisb.; *C. pubescens* Willd; *C. acaule* Ait.; *Arethusa bulbosa* L.; *Listera cordata* R. Br.; and *Habenaria Hookerii* Torr.

A specimen of *Viola tricolor* L., var. *arvensis* Ging., a rare plant in this vicinity, was also exhibited.

Special attention was called to a specimen of *Primula Mistissinica* Michx., sent from Ithaca by Miss Mary E. Macauley. Ithaca is one of the four stations in this state where this relic of the glacial period is found.

MRS. S. H. LINN read a paper entitled:

MUSHROOMS AND EDIBLE FUNGI,

The paper was illustrated by Auzoux models.

MR. JOHN WALTON read a paper entitled:

THE FERTILIZATION OF ORCHIDS.

The paper was illustrated by original charts, colored drawings and living specimens.

A very fine display of cultivated plants from Highland Park was made by MR. JOHN DUNBAR.

JUNE 22, 1897.

The meeting was held at Anderson Hall. PRESIDENT FAIRCHILD in the chair. About ninety persons present.

WOODS HUTCHINSON, M. D., of Buffalo, N. Y., gave a lecture on:

DARWINISM IN DISEASE.

The paper was discussed by Dr. Veeder and Professor Dodge.

October 13, 1897.

The meeting was held at the Reynolds Library. President Fairchild in the chair. Seventy-five persons present.

Dr. Erwin F. Smith, Assistant Pathologist, Division of Vegetable Pathology and Physiology, Department of Agriculture, Washington, D. C., gave an informal account of the investigation of plant diseases by the Department of Agriculture, with special description of the "stem-rot" of cabbage, "brown-rot" of potatoes, "water-spot" of beans, and other bacterial diseases of plants. The paper was illustrated by lantern views and specimens of infected plants.

The paper was discussed by several members. In answer to a question, Dr. Smith stated that no one variety of cabbage was more susceptible to "stem-rot" than others.

A formal vote of thanks was tendered Dr. Smith for his interesting lecture.

November 9, 1897.

The meeting was held at the Reynolds Library. President Fairchild in the chair. Seventy persons present.

Mr. and Mrs. A. J. Perkins, Mr. T. J. Nichols, Commander Franklin Hanford, U. S. N., and Mr. M. S. Baxter were elected to active membership.

Mr. H. L. Preston read a paper upon :

IRON METEORITES AS NODULAR STRUCTURES IN STONY METEORITES.*

The paper was discussed by Mr. John M. Davison, who mentioned the case of an iron meteorite containing hydrogen, which was probably introduced when cooling under a pressure of about five atmospheres.

Commander Franklin Hanford, of the U. S. Steamer Alert, gave a lecture entitled :

NAVAL EXPERIENCES IN THE PACIFIC.

The lecturer described the vessel, of which he was in command

*The paper was published in *American Journal of Science*, Vol. 5, 1898, pp. 62-64.

from June, 1895, to March, 1897. The Alert was on the Pacific station, and the Commander related occurrences in many of the ports entered in Peru, Ecuador, Columbia and the various states of Central America, as well as some in Mexico and our own western coast. He also described a trip to Sitka, and a stay of three months at Honolulu. The value of the Navy to American interests abroad, and the salutary influence of the occasional presence of a war vessel off the coast of a revolutionary state were illustrated by numerous examples.

A vote of thanks was tendered Commander Hanford for his interesting lecture.

NOVEMBER 23, 1897.

The meeting was held at the Reynolds Library. PRESIDENT FAIRCHILD in the chair. Twenty-two persons present.

The paper of the evening was by DR. CHARLES T. HOWARD, and was entitled:

SILK AND SILK CULTURE.

Dr. Howard first gave a historical sketch of the subject, following with a minute description of the various stages of the silkworm, from the egg to the moth. He then described the various varieties of the silkworm and exhibited cocoons of many kinds. He stated that the cocoons were all silk from surface to center, that they shrink about one-half, and again fifteen to twenty per cent. in reeling. He described, by diagrams, the method of reeling silk, and exhibited some samples of silk which he had produced.

The paper was discussed by the President, Mr. J. M. Davison, and others.

DECEMBER 14, 1897.

The meeting was held at the Reynolds Library. PRESIDENT FAIRCHILD in the chair. Thirty persons present.

MR. IRA S. WILE, DR. MONTGOMERY E. LEARY and MR. GEORGE HARTNELL were elected to active membership.

DR. HERBERT U. WILLIAMS, Professor of Pathology and Bac-

teriology in the University of Buffalo, N. Y., gave an illustrated lecture entitled:

THE ACHIEVEMENTS OF BACTERIOLOGY.

Mr. Williams stated that discoveries made by the investigations in bacteriology, during the last few years, had entirely changed the treatment of tuberculosis, diphtheria and other diseases. Views of the bacilli causing typhoid fever, anthrax, cholera, and other diseases were shown, also methods of culture and investigation.

The paper was discussed by the President, Professor Dodge, Mr. Kuichling, and others, and a vote of thanks was tendered Dr. Williams.

JANUARY 11, 1898.

The annual meeting of the Academy was held at the Reynolds Library. PRESIDENT FAIRCHILD in the chair. Ninety persons present.

On recommendation of the Council, it was moved and carried that DR. MONTGOMERY E. LEARY be made Acting Secretary of the Academy.

Annual reports of the officers were given, as follows:

SECRETARY'S REPORT.

There being no regular secretary, MISS BECKWITH reported on the work of the Society as follows:

Fifteen meetings were held during the year 1897, with an average attendance of eighty-five persons. Fifteen new members were elected, and one lost by death. Sixteen papers were presented before the Society, classified as follows: Geography 4; Botany 3; Bacteriology 2; and one each in Agriculture, Anatomy, Economic Entomology, Geology, Meteorology, Pathology, and Zoology.

The report of the Corresponding Secretary, PROFESSOR CHARLES WRIGHT DODGE, was received and adopted.

The Librarian, MISS FLORENCE BECKWITH, reported as follows:

REPORT OF THE LIBRARIAN.

There were added to the library of the Academy, during the

past year, 1375 separate publications, including 700 complete volumes. Of this number of volumes there were received from the

United States	439	Holland	5
Canada	14	Italy	23
Mexico	23	Norway	8
Central America	3	Portugal	9
South America	3	Roumania	1
West Indies	4	Russia	16
Austria	14	Sweden	9
Belgium	12	Switzerland	17
France	28	Japan	1
Germany	42	Java	2
Great Britain	22	Australia	5

No effort was made during the past year to increase the number of societies and institutions on our exchange list, but nine societies solicited exchange of publications and have been entered on the list. Seven societies that were on our list, but had not hitherto sent us publications during the last year, sent us their proceedings. We were favored with personal publications of active and corresponding members to the number of twenty-two pamphlets.

One of the most valuable contributions to the library was from Commander Franklin Hanford, U. S. N., and consisted of twenty-six bound volumes of the Reports of the Coast and Geodetic Survey of the United States from 1851 to 1876, inclusive. This gift makes our set complete to date, and is all the more valuable because it is almost impossible to obtain these particular reports, even by purchase. Commander Hanford has also given us seventeen astronomical publications of the National Observatory at Washington, and twenty-nine pamphlets of Ordnance Notes from the Ordnance Department of the United States Army.

The publications which we receive being largely the proceedings of scientific societies, are mostly unbound, but the number of bound volumes added during the year is greater than ever before, numbering eighty.

Our collection has outgrown the limits of the space kindly allowed us in Anderson Hall, University of Rochester, and there is urgent need that other accommodations be secured where we shall not only have more room, but where the publications will be accessible to the members of the Academy.

Report of the Botanical Section.

The report of the Botanical Section was read by the Recorder, Mrs. J. H. McGuire, and is summarized as follows:

The officers of the Section are: Miss Florence Beckwith, Chairman; Miss Kate R. Andrews, Vice-Chairman; Mrs. J. H. McGuire, Recorder.

Twenty-six meetings were held during the year at the residence of Mr. William Streeter, with an average attendance of ten persons.

The Section has continued the work of identifying and classifying plants found in this vicinity, noting their habitat and reporting new stations as discovered, in order to preserve a record of the flora of Monroe County and adjacent territory as exact and complete as may be, and which shall prove valuable and reliable to botanists for reference.

The following new plants were reported during the year:

Selaginella apus Spring; *Arctium lappa* L. var. *majus* Gray; *Scabiosa australis* Wulf.; *Chenopodium fœtidum* Lamarck; *Aster nova belgii* L. var. *Elodes* Gray; *Prunus mahaleb* L.; *Trillium cernuum* L. (Orleans county); *Matricaria inodora* L.; *Arnoseris minima* Dumort.

New stations were reported for the following rare and infrequent plants:

Euonymus americanus L. var. *obovatus* Torrey & Gray; *Asplenium trichomanes* L.; *Trillium cernuum* L.; *Arenaria michauxii* Gray (A. *stricta* Michx.); *Arenaria lateriflora* L.; *Carex limosa* L.; C. *interior* Bailey; C. *careyana* Torr.; *Hypericum ascyron* L.; *Cacalia suaveolens* L.; *Populus balsamifera* var. *candicans* Gray; *Polanisia graveolens* Raf.; *Sonchus arvensis* L.; *Eleocharis olivacea* Torr.; *Artemisia biennis* Willd.; *Epipactis helleborine* Gray's Man.

During the year much attention was paid to the study of fungi and lichens. Many specimens were exhibited under the microscope by Mr. Streeter, Mr. Baxter and Mr. and Mrs. Perkins.

A double-flowered form of *Ranunculus repens* L. was collected at the eastern wide waters of the Erie canal. Among papers read was one by Mr. M. S. Baxter on *Lemna*, in which he mentioned that Dr. C. M. Booth was the first botanist in America to find *Lemna trisulca* L. in flower.

Botanical Curator's Report.

The Report of the Curator in Botany, Mr. J. B. Fuller, was given, as follows :

During the year there have been added to our herbarium 192 specimens, representing 93 species, 77 of which are new to our collection. Of these species seventy were presented by Dr. Anna H. Searing, collected by herself in the vicinity of Escondido, Cal.

An informal report of the Curator in Geology, Mr. C. J. Sarle, was received and accepted.

The following officers were elected for the ensuing year :

President, Herman L. Fairchild.
First Vice-President, J. M. Davison.
Second Vice-President, George W. Goler.
Secretary, ...
Corresponding Secretary, Charles Wright Dodge.
Treasurer, Joseph E. Putnam.
Librarian, Miss Florence Beckwith.
Councillors, { Edwin A. Fisher, / Henry E. Lawrence, } *until 1901.*

Professor Henry A. Ward presented by title descriptions of

FOUR AUSTRALIAN METEORITES.*

These were named Ballinoo, Mungindi and Mooranoppin.

Professor Charles Wright Dodge read a paper entitled :

THE PSYCHIC ACTIVITIES OF PLANTS.

The paper was illustrated by lantern views.

January 25, 1898.

The meeting was held at the Reynolds Library, President Fairchild in the chair, about 30 persons present.

Professor E. Howard Eaton gave a lecture on

THE MIGRATION OF BIRDS.

*Published in *American Journal of Science*, Feb. 1893. Vol. V., pp. 135–140.

The paper was discussed by Professor Fairchild, Mr. Baxter, Mr. Bradstreet, Mr. O'Connor, Miss Beckwith, and others.

FEBRUARY 8, 1898.

The meeting was held at the Reynolds Library, the President in the chair, about twenty persons present.

DR. FREDERICK J. TUNMORE and MR. A. BENEDICT were elected to active membership.

MR. FREDERICK W. ROSS gave a paper on

PLANT GALLS.

The paper was illustrated by charts and specimens.

FEBRUARY 22, 1898.

The meeting was held at the Reynolds Library, with about sixty persons present. In the absence of the President, MR. E. L. POTTER acted as chairman.

MR. JOHN DENNIS, the inventor of the Fluorometer, gave a lecture upon

THE ROENTGEN ENERGY IN PRACTICAL SURGERY, WITH A DEMONSTRATION OF THE OPERATION OF THE FLUOROMETER.

A very interesting discussion followed the demonstration, and a vote of thanks was given the lecturer.

MARCH 8, 1898.

The meeting was held at the Reynolds Library, PRESIDENT FAIRCHILD in the chair, about 125 persons present.

The Council recommended the election of the following members as fellows of the Society: E. A. Fisher, M. S. Baxter, C. C. Laney, H. E. Lawrence, Henry Lomb, C. R. Sumner, Gaylord Thompson, Commander F. Hanford, U. S. N., E. Howard Eaton, Montgomery E. Leary.

Under the rules the names were laid upon the table for a month.

The first paper of the evening was given by H. L. PRESTON upon

THE SAN ANGELO METEORITE.*

MR. ADELBERT CRONISE gave a lecture upon

A TRIP THROUGH INDIA.

The lecture was illustrated by a large number of lantern views.

MARCH 22, 1898.

The meeting was held at the Reynolds Library, PRESIDENT FAIRCHILD in the chair, about sixty persons present.

DR. L. A. WEIGEL read a paper upon

THE ANATOMY AND MECHANISM OF THE FOOT, CONSIDERED WITH REFERENCE TO DISTORTIONS AND IMPERFECTIONS IN DEVELOPMENT—MODERN FOOTWEAR AS A POTENT FACTOR.

The paper was illustrated by lantern views, models and casts, also by a collection of modern shoes ranging from those worn by infants to those of adults.

A vote of thanks was given to Dr. Weigel for his very interesting paper.

APRIL 12, 1898.

The meeting was held at the Reynolds Library, PRESIDENT FAIRCHILD in the chair, fifty-six persons present.

The names of the ten members of the Society nominated for fellowship at the meeting of March 8, were taken from the table, and on unanimous vote, the Secretary cast a ballot electing them Fellows of the Academy.

MR. J. G. D'OLIER exhibited some Indian beads, bead-work, and other relics, and gave an interesting description.

MR. GEORGE H. CHADWICK gave a paper on

THE CATSKILLS.

The paper was illustrated by lantern views.

*This paper was published in the *American Journal of Science*, Vol. V., 1898, pp. 269-272.

APRIL 26, 1898.

The meeting was held at the Reynolds Library, the President in the chair; forty-two persons present.

MR. E. L. POTTER showed two very interesting articles from Samoa ; one a garment made of wood fibre, usually the sole clothing of the wearer ; the other a package about eight inches long and five inches in diameter, containing a bunch of bananas compressed for preservation during times of scarcity.

MR. EMIL KUICHLING read a paper on

THE HEMLOCK WATER CONDUIT.

The paper was illustrated by views taken during the construction of the line.

MAY 10, 1898.

The meeting was held at Anderson Hall, PRESIDENT FAIRCHILD in the chair, one hundred eighteen persons present.

The Council recommended the election of DR. MONTGOMERY LEARY as Secretary to fill the remainder of the term, and the election of Professor E. L. Nichols as a corresponding member. Under the rules these nominations were laid on the table until the next business meeting. MR. SOL WILE was elected an active member of the Society.

PROFESSOR EDWARD L. NICHOLS, of Cornell University, gave an illustrated lecture on

COLOR VISION AND COLOR BLINDNESS.

A vote of thanks was given Professor Nichols.

MAY 24, 1898.

The meeting was held at Anderson Hall, PRESIDENT FAIRCHILD in the chair, one hundred twenty-one persons present.

This being the annual public meeting of the Botanical Section, PRESIDENT FAIRCHILD introduced MISS BECKWITH, the Chairman of the Section, who assumed the chair.

After stating the object of the meeting, Miss Beckwith called special attention to the exhibit of New Zealand Ferns, presented to the Academy by MR. C. W. SEELYE, and also to the specimens of Greenland plants collected by the Peary Relief Expedition, and presented to the Academy by PROFESSOR W. W. ROWLEE, of Cornell University.

Brief extracts from the detailed account of the botanical results of the expedition, published by Professors Rowlee and Wiegand, were read by the Recorder of the Section, MRS. J. H. MCGUIRE.

MR. A. J. PERKINS read a paper entitled :

NOTES ON THE YOSEMITE FLORA.

The paper was illustrated by mounted specimens collected by MR. and MRS. PERKINS.

MR. E. HOWARD EATON read a paper on

ECONOMIC BOTANY AS AFFECTED BY OUR COMMON BIRDS.

The paper, naming the birds most useful in protecting the crops of the farmers, was not only of great interest to botanists and the cultivators of the soil, but to all lovers of our song birds as well. It was illustrated by prepared skins of the birds described.

PROFESSOR CHARLES WRIGHT DODGE gave an address on

GERMINATION.

The address was illustrated by lantern slides and experiments.

A fine collection of rare native plants, mostly collected at Bergen Swamp, was shown.

MR. JOHN DUNBAR exhibited a fine collection of flowers from Highland Park, and MESSRS. J. B. KELLER & SONS also contributed some choice cultivated plants.

JUNE 21, 1898.

The meeting was held at the Reynolds Library, PRESIDENT FAIRCHILD in the chair, thirty-nine persons present.

The nomination of DR. MONTGOMERY E. LEARY for Secretary of the Academy was taken from the table and he was duly elected. PROFESSOR E. L. NICHOLS, of Cornell University, was elected a corresponding member of the Academy. DR. C. W. LA SALLE and DR. F. H. SOWERS were elected active members.

The following paper was read :

A NEW METHOD OF ETCHING IRON METEORITES, WITH SPECIAL ADAPTATION FOR PHOTOGRAPHIC OR PLATE PURPOSES.

By H. L. PRESTON.

It has been my pleasure for many years past, in my connection with Ward's Natural Science Establishment, to have the supervision of the cutting, polishing and etching as well as the general care of their large collection of Meteorites.

I have been constantly annoyed by the tendency of the etched slices to rust or corrode. This rusting causes continual work, in cleaning, repolishing and etching of the masses, which means not only a loss in time spent thereon, but a constant decrease in the weight of the specimen as well, which, as the value of meteorites are estimated at so much per gramme, means a net loss of many dollars per year. In experimenting by various methods to overcome this, I have at last come upon a process, which as far as I know is entirely new for this purpose.

Meteorites are generally considered as consisting of three nickel-iron alloys, viz. kamacite, taenite and plessite, as first shown by Reichenbach. More recent investigations however, by Davison, tend to show that there are really but two alloys, and that the plessite is composed of very narrow alternating bands of kamacite and taenite.

The chemical composition of these alloys as far as the Fe and Ni alone is concerned, according to Davison is

Kamacite	Fe. 93.09	Ni. 6.69
Plessite A	Fe. 92.81	Ni. 6.97
" B	Fe. 72.98	Ni. 25.87
Taenite	Fe. 74.78	Ni. 24.32

(Mr. Davison in analyzing the plessite separated it into two parts, the above analysis will show how close part A comes to the kamacite and part B to the taenite, thus strongly suggesting that it is composed of alternating bands of each.)

The principle in etching so as to bring out the Widmanstätten figures, or crystalline structure of the iron, is to use a solvent that will more readily attack one portion of the mass than another. As the kamacite contains a much larger percentage of iron it is more readily attacked or dissolved by the acid than the other alloys, thus allowing the bands of kamacite to become depressed or intaglio, while the taenite and plessite stand out in relief. For this purpose various methods have been used, bichloride of mercury, nitric or hydrochloric acid, or a combination of the two of various degrees of strength, depending upon the readiness or backwardness with which the iron will etch, etc., etc. In some irons it is only necessary for them to come in contact with the acid for three or four seconds in order to bring out distinctly the crystalline structure, while with others fifteen or twenty minutes or more are required.

There are several reasons why the use of acids has been unsatisfactory for the work. In the first place they act upon the taenite and plessite almost as readily as upon the kamacite, so we do not get the detail required from the lack of relief in the more nickeliferous alloys. In the second place most or all iron meteorites are filled to a greater or less extent with fissures passing between the kamacite and taenite bands. The acids percolate through these fissures to considerable depths, so that it is almost impossible to treat the newly etched slices so as to thoroughly neutralize the effect of the acid that has penetrated them ; the result being that in a short time, even though the surface be well oiled or coated with paraphine, we observe a discoloration extending in lines over the surface. Many times these are the first indications we have of a fissure or crack, as they were not perceptible to the eye on the newly etched face. After a time this line commences to spread and finally a thick layer of rust is formed, which not only mars the beauty of the surface, but in many cases is impossible to remove without repolishing the slice. For these reasons it has been my desire to substitute a solvent for the acid and thus overcome these annoyances.

Bichloride of mercury (corrosive sublimate) has long been used to take the place of acids, and will overcome many of the difficulties caused by the acids, but there are objections to it. In the first place it is a very dangerous solution to have around ; again we frequently get a coating of mercury on the iron, which at times causes some trouble to dispose of, and as far as my experience has gone with it I

have found it slow, and in many cases was unable to obtain good results.

Recently I have been experimenting with another iron solvent, with the best of results in more ways than one. In testing this solvent I found that I had a process that would prepare the slice for photographic purposes, so that the very finest blades of taenite would be distinctly brought out in the photograph, showing lines of taenite readily that on an ordinary etched slice could scarcely be seen with a very strong lens.

This feature alone makes the process a much more desirable one than any method previously used, as we are enabled to obtain a photograph showing the minutest detail as to form and structure of the Widmanstätten figures that for study of these characters is far superior to the etched specimen itself, under ordinary circumstances. The most important feature of the process, however, is that we have no effects of acid to neutralize to keep the irons from rusting or corroding in the future, as the solvent itself is neutral.

In endeavoring to overcome some difficulties in experimenting with another method, I had occasion to interview Prof. S. A. Lattimore of the University of Rochester. In our talk he stated that ammonium copper chlorid is mentioned in the books as being one of the best iron solvents, and suggested that I try it. I did so, and after experimenting some time with it as to strength, best manner of application, etc., my hopes were more than realized. It was found that the strength of the solution to obtain the desired effect was not a constant one, but had to be varied according to the iron in hand. It was also found that a weaker and consequently slower acting solution brought out the greatest detail. And much to my surprise it was found that the solution coated the more nickeliferous alloys, even to the minutest bands of taenite, with the chlorid of copper, leaving the blades of kamacite bright and clean.

So accurately does the opaque brick red deposit of the copper do its work, that in many of the patches of plessite which to the unassisted eye looks as though they were entirely coated with copper, a lens shows the alternating layers of kamacite bright and clear not a hair or more in width.

Again, as its dissolving power upon the strongly nickeliferous and least nickeliferous alloys is of a marked difference, it permits the former to stand out in bold relief, thus giving prominent and decided structural figures.

The iron in this condition can be thoroughly cleaned and dried, the moisture being driven out of the iron to prevent rusting. It is then ready for the camera. The strong contrast between the kamacite of silver color and the brick red taenite gives a negative that is strong and sharp, the taenite taking black, the kamacite light, which is the effect desired, as the kamacite on an etched surface is always much lighter in color than the taenite and plessite. It further places the iron in a condition to study even the minutest complicated structure of the Widmanstätten figures without a strain on the eye as in the case where the iron is uncolored.

The copper coating can then be removed by soaking the specimen in concentrated ammonia ; then we wash with alcohol to evaporate the moisture, heat the iron thoroughly, coat it with parafine, and we have a beautifully etched meteorite of even color that will remain for years without discoloring.

It will be readily seen that the advantage of this process in photography will be more effective in those irons in which the figures are composed of narrow laminae such as the Grand Rapids, Mungindi, Hamilton Co., etc., in which you can place your object in such a position as to get rid of the evil effects of reflection. In irons of broad laminae such as Canon Diablo, Bendego, Wichita Co., etc., the reflection on the broader plates of kamacite would be such that the photograph, as far as the figures are concerned, would not be as sharp and decided as in the former case.

Previously we had to depend entirely upon reflection for a good result in photographing etched surfaces of meteorites, while in this process the result depends upon the contrast in color caused by the deposit of copper.

The paper was illustrated by a number of specimens of meteorites.

PROFESSOR H. L. FAIRCHILD gave a lecture upon

ANIMAL SELF-DEFENSE

illustrated by lantern views.

OCTOBER 11, 1898.

The meeting was held at the Reynolds Library, PRESIDENT FAIRCHILD in the chair ; twenty persons present.

Various members contributed notes of their summer experiences.

MR. J. G. D'OLIER exhibited a fine collection of Indian relics found near Wilson's Station, in Bloomfield, describing the locality in which they were found, and stating that the land features had been little changed by the processes of agriculture.

MISS BECKWITH showed a collection of dahlias, lilies, and nasturtiums, which illustrated how single flowers are changed into double ones by cultivation, the stamens and pistils being in the process of transformation into petals.

DR. S. A. LATTIMORE described Mt. Desert Island, on the coast of Maine, where he spent his vacation, speaking of the geological formations and natural beauties of the island.

DR. CHARLES H. HOWARD mentioned the appearance of a foreign insect, *Attica syntha*, at Bridgewater, Conn. He said that it had probably escaped from some one's collection, but that there was no danger of its becoming harmful in this country.

MR. BAXTER stated that the Russian Thistle was becoming abundant on the river flats below the gas works, and that steps should be taken to eradicate it.

MR. C. J. SARLE spoke of some discoveries which he had made in regard to *Arthrophycus Harlani*, which go to show that these structures are plants and not worm tracks, as some geologists have thought. They are forked and the various branches may be traced to a common base. They are also twisted, as seaweeds often are by the wash of the waves. Fragments of them have been broken off, and evidently washed around, and the surfaces are pitted.

Mr. Sarle also thought the *Spirophyton* and allied forms found in the Medina sandstone are not worm tracks, but fossil plants.

MR. J. M. DAVISON described a

QUARTZ NODULE WITH RADIATE STRUCTURE.

This nodule of quartz was found in the Laurentian gneiss at Greenfield, Saratoga Co., N. Y. In this locality the gneiss has been penetrated by veins of trap rock, with resultant metamorphic changes in the character of the gneiss. The nodule was embedded in a chloritic mass. Its color is greenish-white ; structure radiate ; hardness 6-7 ;

infusible in the blowpipe flame, but turning opaque ; specific gravity 2.67. Its analysis gave

Si_2O	93.73	MgO	.26
Al_2O_3	2.46	SO_3	2.77
FeO	.42	H_2O	.37
CaO	.48		
			100.49

Mr. Davison also announced the discovery of

PLATINUM AND IRIDIUM IN METEORIC IRON.*

From 608.6 gms. of Coahuila meteoric iron there was obtained 0.014 gms. of platinum, and 0.0015 gms. of iridium. From 464 gms. of Toluca meteoric iron were obtained a few crystals of potassium platinichloride which showed the reddish color due to the presence of iridium.

OCTOBER 25, 1898.

The meeting was held at the Reynolds Library, PRESIDENT FAIRCHILD in the chair; thirty-one persons present.

DR. M. A. VEEDER, of Lyons, N. Y., a corresponding member of the Academy, read a paper entitled

THE SPREAD OF TYPHOID FEVER AND KINDRED DISEASES BY FLIES.**

NOVEMBER 22, 1898.

The meeting was held at Anderson Hall, PRESIDENT FAIRCHILD in the chair; seventy-nine persons present.

The lecture of the evening was given by MR. JOHN S. SHEARER, Department of Physics, Cornell University, and was entitled :

WAVE THEORY IN MODERN PHYSICS.

The lecture was illustrated by experiments. A vote of thanks was given the lecturer.

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*The paper is printed in *American Journal of Science*, IV. Vol. 7, 1899, p. 4.

**A prodrome of this paper entitled " Flies as Spreaders of Sickness in Camps," appeared in the *Medical Record* of September 17, 1898.

DECEMBER 13, 1898.

The meeting was held at the Reynolds Library, PRESIDENT FAIRCHILD in the chair; thirty-two persons present.

The following persons were elected active members of the Academy: HENRY W. CONKLIN, HAROLD C. KIMBALL, CHARLES A. DUNHAM, DR. B. S. HERT, L. B. ELLIOTT.

DR. WILLIAM P. SPRATLING, of Sonyea, N. Y., read a paper entitled:

NEW PRINCIPLES IN CHARITY, AS EMBODIED IN THE CRAIG COLONY FOR EPILEPTICS.

The paper was discussed by DR. E. B. POTTER, DR. VAN DER BECK, DR. GOLER, MR. EMIL KUICHLING, MRS. KUICHLING and DR. BALLANTINE.

A vote of thanks was tendered DR. SPRATLING.

JANUARY 10, 1899.

The meeting was held at the Reynolds Library. The Librarian, MISS BECKWITH, called the meeting to order. The attendance was so small, on account of the exceedingly cold weather, that the meeting was adjourned to January 24th.

JANUARY 24, 1899.

The meeting was held at the Reynolds Library, PRESIDENT FAIRCHILD in the chair; sixty-four persons present.

It was moved and carried that the business postponed from the last meeting be further postponed to the next regular business meeting, February 14th.

MR. C. H. EDSON, who for two years had acted as a missionary in Alaska, gave a lecture on

ALASKA, ITS PEOPLE, FLORA AND FAUNA,

illustrated by lantern views, photographs, and Esquimaux and Indian work.

A discussion of the lecture followed and a vote of thanks was tendered MR. EDSON.

FEBRUARY 14, 1899.

BUSINESS OF THE ANNUAL MEETING.

The meeting was held at the Reynolds Library, PRESIDENT FAIRCHILD in the chair ; thirty-five persons present.

MR. J. J. QUINN was elected an active member of the Academy.

The reports of officers and the election of officers for 1899, postponed from the last meeting, were taken up in their regular order.

SECRETARY'S REPORT.

The Secretary, DR. M. E. LEARY, reported that fifteen meetings were held during the year with an average attendance of sixty-one. Twenty-five papers were read, classified as follows : Botany, six ; Physics, three ; Geology, two ; Travel, three ; Ethnology, two ; Meteorology, two ; and one each in Ornithology, Chemistry, Anatomy, Sociology, Zoology, Hygiene, Hydraulics.

TREASURER'S REPORT.

The Treasurer, MR. J. E. PUTNAM, submitted his report for the year, with a balance sheet showing a small balance in the treasury.

A brief report was given by the Corresponding Secretary, PROFESSOR CHARLES WRIGHT DODGE.

LIBRARIAN'S REPORT.

The Librarian, MISS FLORENCE BECKWITH, reported that about 450 volumes, pamphlets and separate publications, had been added to the library during the year 1898, distributed as follows :

United States	205	Italy	21
Canada	17	Luxembourg	1
Mexico	15	Norway	6
Central America	1	Portugal	4
South America	7	Roumania	1
West Indies	4	Russia	27
Austria and Hungary	22	Spain	2
Belgium	8	Sweden	6
France	22	Switzerland	9
Germany	47	Java	2
Great Britain	19	Australasia	3
Holland	4		

From members, corresponding members and miscellaneous sources we have received 73 publications. The number of bound volumes received was 28. In this connection the librarian would earnestly request the members of the Academy to contribute to the library copies of any scientific papers which they may publish.

Our foreign exchange list comprises over 300 of the most important scientific societies and institutions of other countries. As the publications of these societies and institutions are not obtainable by libraries in general, it is doubtful if such a collection of scientific literature can be found anywhere else in Western New York. It is of inestimable value to all who are interested in science, and especially to those who are pursuing scientific investigations.

One of the most notable publications received during the year was from the National Museum of Amsterdam. This elegant volume came to us through the kindness of Dr. David J. Hill, Assistant Secretary of State, a member of the Academy during his residence in Rochester, and now a Corresponding Member of the Society.

Report of the Botanical Section.

The report of the Botanical Section was read by the Recorder, Mrs. J. H. McGuire, summarized as follows :

The officers of the Section are: Miss Florence Beckwith, Chairman ; Mr. William Streeter, Vice-Chairman ; Mrs. J. H. McGuire, Recorder.

The Section has met regularly once in two weeks at the residence of Mr. William Streeter, as has been customary for the past ten years. Twenty-five meetings were held during the year, including the annual public meeting on May 24, at Anderson Hall, University of Rochester.

Symplocarpus fœtidus Salisb. was reported in blossom on February 14 ; *Acer dasycarpum* Ehrh. showed buds partly open on February 11 and fully open March 6, two to three weeks earlier than in 1897.

The following new plants were reported during the year :

Teesdalia nudicaule R. Br. ; *Myosotis versicolor* Pers. ; *Sceleranthus annuus* L. ; *Physalis lanceolata* Michx. var. *hirta* Gray ; *Ambrosia psilostachya* DC. ; *Helianthus annuus* L. (the wild form); *Galinsoga arviflora* Cav. var. *hispida* DC. ; and a *Rumex* supposed to be a

hybrid between *R. crispus* and *R. patientia*, possessing some characteristics of each species.

New stations were reported for the following rare or infrequent plants :

Silene cucubalus Wibel. (*S. inflata* Smith); *Plantago patagonica* Jacq. var. *aristata* Gray ; *Trifolium procumbens* L.; *Leontodon autumnale* L.; *Oenothera pumila* L.

Much microscopical work was done on Fungi and Lichens during the year. MR. STREETER conducted microscopical studies at many of the meetings, showing at different times fruited specimens of Lichens, prothallia of Ferns, Algæ, filterings of Hemlock water and a large collection of Diatoms. MR. F. W. ROSS exhibited at different times a large number of galls found on various trees and plants.

REPORT OF THE CURATOR IN BOTANY.

The report of the Curator in Botany, MR. J. B. FULLER, was read as follows :

The accessions to the herbarium of the Academy during the year 1898 consist of 280 very fine specimens from the Cayuga Lake basin, including several rare species, contributed by Mr. R. L. Junghans. Eighty species of prairie plants, nearly all of them new to our herbarium, presented by Mrs. T. F. Wingo, of Wills Point, Texas. Of the collections made by members of the Botanical Section, only about two hundred have been preserved.

About four hundred specimens have been mounted, making the total number of mounted specimens a little over 5,000.

During the year, several collections which had been kept in separate lots, comprising about 7,000 unmounted specimens, have been consolidated, thus rendering them more convenient for reference and comparison.

In accepting the report of Mr. Fuller, it was moved and unanimously carried, that the Academy extend a vote of thanks to him for the exceeding interest he has manifested in the herbarium of the Society, for the great amount of work he has done and the time he has spent in classifying and arranging the specimens.

The following officers were elected for the year 1899 :

President, HERMAN L. FAIRCHILD.
First Vice-President, GEOGRE W. GOLER.
Second Vice-President, CHARLES WRIGHT DODGE.
Secretary, MONTGOMERY E. LEARY.
Corresponding Secretary, CHAS. WRIGHT DODGE.
Treasurer, JOSEPH E. PUTNAM.
Librarian, MISS FLORENCE BECKWITH.
Councillors, { EMIL KUICHLING, / J. M. DAVISON, } *until 1902.*

The President read a paper illustrated by lantern views, maps and charts, on

THE PREDECESSORS OF NIAGARA.

BY H. L. FAIRCHILD.

(Abstract.)*

The ancient streams which may be regarded as the ancestors of Niagara were hundreds of miles from the present cataract. These extinct rivers have left remarkable gorges across the ridges separating the north and south valleys of Skaneateles, Otisco, Onondaga, Butternut and Limestone, and they lie along a line adjoining the villages of Marcellus, South Onondaga, Jamesville, High Bridge and Mycenae. To trace Niagara's ancestry back to the time when it is possible to discover any trace of the course of the original waters, it is necessary to go back to the glacial period. The last great invasion of ice buried all of New England, all of New York State, except a small area near Salamanca, all of the basins of the Great Lakes and the Mississippi Valley as far south as nearly to the mouth of the Ohio river.

This ice body, some thousands of feet in thickness, uncovered the land it had invaded, not by general melting of its surface, but by the slow recession of its front. The summer floods from the rainfall and the ice melting carried immense quantities of gravel down the south-leading valleys and filled them deeply with the detritus. When the ice front retreated to the north side of the divide separating to-day the northward drainage of the St. Lawrence from the southward drainage of the Mississippi and Susquehanna, the waters were impounded between the ice front and the north-sloping land surfaces.

*Fuller discussion of the subject may be found in *Bull. Geol Soc. Am.* Vol. 10, pp. 27-68; *Am. Jour. Sci.*, Vol. 7, pp. 249-263; *20th An. Rep. New York State Geologist*, *1900*, pp. 112-130.

The glacier occupied the Laurentian basin and all its present low northward and eastward passes, and consequently all the waters were forced across the divide to the southward. When the west end of the Superior basin was uncovered, it held a glacial lake, which we call Lake Duluth. In the same way a local glacial lake was formed in the southern end of the Michigan basin, known as Lake Chicago, and in the western end of Erie basin, called Lake Maumee. The lowest of the three outlets of these lakes was that of Lake Chicago, which formed the channel now utilized by the Chicago drainage canal. Eventually, by the continued recession of the ice front, land was uncovered either side of the Michigan valley, lower than the St Croix outlet of Lake Duluth or the Fort Wayne outlet of Lake Maumee, and the Chicago outlet robbed the two higher outlets.

The high glacial waters of the Erie basin were finally extended north and east by the continued recession of the ice dam, until they covered all of the Erie basin, the lower Huron basin and the southwestern part of the Ontario basin. These waters are called Lake Warren. At this time the ice front lay against the high ground southward from Syracuse, and therefore blocked the waters from the low pass at Rome to the Mohawk valley, which was lower in altitude than the Michigan outlet of Lake Warren waters.

As the ice front weakened and receded in the Syracuse region, the Warren waters, which formed in New York a belt several miles in width along the ice border, and reaching southward up the valleys of the present "finger" lakes, crept eastward at their proper level.

One summer day, the critical moment came, and the high water found escape eastward past the ice to the open Mohawk-Hudson. At first this may have been an insignificant spilling, but the flow increased, and with the downcutting of the waste-weir an irresistible flow was established. The first spillway we cannot precisely locate, but it is probably one of two east-and-west gorges in rock, one being two miles east of Jamesville, the other two miles southwest.

With the farther retreat of the ice front, other lower canyons were cut, and a series of great rock gorges were made leading across the ridges that separated the north and south valleys in which the glacial waters were ponded at their successive levels. The most western of the canyons heads on the Onondaga limestone, about four miles north by east of Skaneateles and conveyed the flood of hypo-Warren waters eastward to the Otisco valley, building a huge delta south of Marcellus village.

From this valley the waters escaped to the Onondaga valley by another splendid canyon east of Marcellus, with an enormous delta at South Onodaga village. From the Onondaga valley three fine canyons lead east to the Butternut valley near Jamesville. The lowest and finest of these is the great rock cut utilized by the Delaware, Lackawanna and Western Railroad in passing from Syracuse over to Jamesville. East from Jamesville are three cuts leading east to the limestone valley at High Bridge, and three more lead on northeast to lower ground at the level of lake Iroquois.

At least three of the canyons are headed by cataracts similar to Niagara. One fine cataract is at the head of the middle one of the three gorges at Jamesville, with Jamesville Lake filling the basin in the amphitheatre. Another cataract is northeast of Jamesville one and one-half miles, with Blue Lake in the plunge basin, and a fine one is located two miles southwest of Mycenae. In the latter the pool at the foot of the cataract has been filled.

Other and subsequent channels are found northward; one at Camillus and one passing through the centre of Syracuse. The altitudes of these channels show a descending flow eastward in each series. The upper ones have an elevation much above Chicago, because all the land of the Laurentian era has suffered, since the ice removal, an unequal uplift that has given the old water planes a northward rise, amounting in the Syracuse region to about 300 feet as compared with Chicago. The present altitude of the ancient glacial lake surface at Chicago is about 600 feet above ocean, while the corresponding plane at Syracuse is nearly 900 feet.

These canyons and fossil cataracts in the Syracuse region were functionally the predecessors of Niagara, as they drained the waters of the Erian level down toward the Ontarian level. They were not the outlets of Lake Warren, for that lake had its outlet across Michigan to Lake Chicago and so ultimately to the Mississippi. The Syracuse gorges were cut by falling waters inferior to Warren. We might call the waters hypo-Warren; but as they were flowing eastward and tending toward Iroquois level a better name is hyper-Iroquois. The long-permanent Iroquois lake had its outlet at Rome, N. Y., to the Mohawk valley. One long pause in the falling hyper-Iroquois waters, the great gorge leading east from Marcellus probably being its outlet, has left excellent beaches on the west side of the Seneca valley and other evidences of lake erosion westward, at an elevation of about 700 feet. This water is named Lake Dana.

The altitudes of the water planes in feet above ocean may be generalized as follows for Central New York: Warren, 880; Dana, 700; Iroquois, 440.

Niagara river did not come into existence until the falling lake waters succeeding Lake Warren dropped below the lowest point in the rim of the Erie basin, so as to separate the Erie waters from the Ontario waters. The present elevation of Lake Erie is 572 feet. Probably the Erie basin waters were separated and the Niagara river flow initiated when the hyper-Iroquois waters were outflowing by the great railroad channel at the southeast edge of Syracuse. The altitude of the bottom of this channel is 540 feet.

At first, as pointed out by G. K. Gilbert, the Erie waters had two places of overflow, one at Lockport and the other at Lewiston; but the latter spillway prevailed and robbed the former.

FEBRUARY 28, 1899.

The meeting was held at Anderson Hall; PRESIDENT FAIRCHILD in the chair; seventy-eight persons present.

MR. PERLEY DUNN ALDRICH read a paper entitled:

DEVELOPMENT OF THE IDIOMS OF MUSICAL EXPRESSION.

MR. ALDRICH explained that music is a language in which the thought and feeling of the great composers finds expression. These idioms of expression, which the composers of music have developed, have changed greatly since part music was first attempted. The speaker described the formation of the various scales on which music was founded, and then explained the meaning of organum, counterpoint, fugue and canon, and showed their development. He then took up the invention of opera and what is known as the monophonic school of composition, and from that went on to explain some of the most remarkable of the modern harmonies and the sonata form. His remarks were illustrated by selections from various composers both known and unknown, and included a sarabande by Handel, a canary by Lully, Lady's Carey' Dump, a minuet by Jeremy Clark, an old pavan, and a movement from one of Beethoven's sonatas, the latter played by Mr. George Fisher.

MARCH 14, 1899.

The meeting was held at the Reynolds Library, PRESIDENT FAIRCHILD in the chair ; one hundred persons present.

MRS. C. R. SUMNER and DR. CHARLES T. MITCHELL, of Canandaigua, were elected active members.

MR. ELON HOWARD EATON read a paper entitled

BIRDS OF WESTERN NEW YORK.*

The paper was illustrated by prepared skins of most of the birds of this vicinity.

MR. EATON suggested the forming of an Ornithological Section of the Academy, and several of those present expressed a desire to join such a section.

MARCH 28, 1899.

The Academy united with the Rochester Public Health Association in holding a meeting in the hall of the Chamber of Commerce. Over three hundred persons were present.

The meeting was called to order by PRESIDENT H. L. FAIRCHILD, who, after stating the object of the meeting, was followed by DR. E. M. MOORE, President of the Health Association, who assumed charge of the further proceedings.

The paper of the evening was by DR. GEORGE W. GOLER upon

THE DISTRIBUTION OF TUBERCULOSIS IN ROCHESTER, ITS CAUSATION, PREVENTION AND HYGIENIC TREATMENT.

The lecturer showed a map of Rochester on which were marked the localities in which deaths from tuberculosis had occurred during the last twelve years. He briefly explained that in the sections where the most deaths had occurred the conditions were the poorest ; and that in the districts that were comparatively free from the disease this was traceable to the fact that the inhabitants have good drainage, pure air and sunlight in abundance.

* This paper is printed in the Proceedings of the Academy, volume 4, pages 1-64.

APRIL 11, 1899.

The regular meeting of the Academy was suspended, in order to allow the members to accept the invitation of the Faculty of the University of Rochester to attend a course of Lectures on Astronomy, by MISS C. DE P. P. MAURY, in Anderson Hall.

APRIL 25, 1899.

The meeting was held at the Reynolds Library, VICE-PRESIDENT G. W. GOLER in the chair; eighty-five persons present.

The Council recommended for election to Life Membership, MR. WILLIAM STREETER, a charter member of the Academy, a man eminent for his scientific accomplishments, and one who has throughout the life of the Society worked for its advancement, and for more than twelve years has given the use of his house for the meetings of the Botanical Section.

Under the rules the recommendation was laid upon the table until the next business meeting.

MR. W. C. WORTHINGTON read a paper on

LIQUID AIR.

The paper was based on information obtained and experiments performed in the Laboratory of MR. TRIPLER. Considerable discussion followed, after which a vote of thanks was tendered MR. WORTHINGTON.

JUNE 13, 1899.

The meeting was held at the Reynolds Library, PRESIDENT FAIRCHILD in the chair; thirty-five persons present.

The nomination of MR. WILLIAM STREETER for Life Membership, which was laid on the table at the last business meeting, was taken up.

PROFESSOR FAIRCHILD spoke of Mr. Streeter's work; the debt the Academy owes him, particularly the Botanical Section to whom

he has opened his house as a meeting place for the last twelve years. Mr. Streeter had thought that as he was growing older and had less time and energy for work, it was his duty to resign from active membership. But the Academy cannot consent to his retirement and desires to present him this Life Membership.

Miss Beckwith, the Chairman of the Botanical Section, added her tribute to Mr. Streeter, saying that he had not only hospitably opened his house for the meetings of the Section, but he had freely given his time and the use of his library, specimens, and scientific apparatus.

On motion of Professor Charles Wright Dodge, Mr. Streeter was unanimously elected a Life Member of the Academy.

The following persons were elected active members of the Society : Mr. S. C. Pierce, Mr. G. H. Waldron, Dr. Porter Farley, Mr. J. Oettinger, Mr. G. W. Kellogg, Mr. Mark W. Way, Miss Mary Frazer, Miss F. A. Reichenbach, Miss Laura L. Snell, Miss Julia F. Whiton, Miss Gertrude C. Blackall, Miss Belle C. Wiley, Miss Edith M. Brace, Mrs. Letitia Siddons, Mrs. Emma L. Haviland.

Dr. G. W. Goler spoke of the results of the establishment by the Board of Health of milk stations for providing pure milk for children in Rochester.

Professor C. W. Dodge gave the results of some experiments in filtering milk. It had been hoped that filtering would take the place of Pasteurizing the milk for these stations, but it was not found to reduce the number of bacteria to any marked degree. In the milk which was Pasteurized there were no traces of bacteria.

Mr. George H. Chadwick spoke of the "Seventeen-year Locusts" now invading the towns of Greece and Webster and the country north of Rochester. It is an irregular visit, but they are the genuine seventeen-year Locusts, *Cicada septendecim*.

Professor Charles Wright Dodge gave a lecture upon

FERTILIZATION AMONG PLANTS.

The lecture was illustrated by a large number of lantern views.

OCTOBER 10, 1899.

The meeting was held at the Reynolds Library; PRESIDENT FAIRCHILD in the chair; thirty-four persons present.

A letter from MR. WILLIAM STREETER was read, thanking the Academy for his election to Life Membership.

PRESIDENT FAIRCHILD spoke of the death of Mr. Elon Huntington, one of the older members of the Academy and a regular attendant on the meetings for many years.

DR. CHARLES T. MITCHELL, of Canandaigua, read a short paper describing two species of fish native to the waters of Canandaigua Lake : lake trout and lake shiners, or ciscoes, the latter furnishing food for the former. The paper minutely described the fish, their habits and general history.

The paper was discussed by PROFESSOR FAIRCHILD and MR. C. J. SARLE.

Mr. J. M. DAVISON exhibited a garnet ball of about one and three-quarters inches diameter which showed a beautiful asterism. Three great circles of violet light crossed it, forming by their intersection eight spherical triangles and four four-sided figures. In diffused light these circles were faint broad bands. In strong, direct sunlight they were fine, sharp lines which seemed to stand out from the ball.

DR. CHARLES T. HOWARD exhibited a specimen of a so-called "kissing bug," *Apsistus personatus*, found near his residence. It is one of the assassin bugs which prey on other bugs, and belongs to the squash-bug family.

MR. HENRY L. WARD exhibited a portion of a meteorite, known as the Allegan meteorite.*

MR. H. L. PRESTON gave an account of his search after meteorites in Ohio.

MR. C. J. SARLE told of an excursion taken with the American Association for the Advancement of Science, from Columbus, Ohio. The trip was through a mine in the bituminous coal region, sixty miles south of Columbus. A carboniferous forest, the trees remaining in their position of growth, was an object of great interest in this mine.

*Described in *American Journal of Science*, Series 4, Vol. VIII, pp. 412-414. 1899.

MR. J. E. PUTNAM showed the results of some original and promising investigations which he had been making in color photography.

MR. H. K. PHINNEY spoke of the loss of a tree of the striped maple (*Acer pennsylvanicum*). This species of maple is rare in the city, only two specimens growing in Highland Park and one in Seneca Park. The one cut down was growing on Alexander street, and, so far as known, was the only one in the city outside the parks.

MR. GEORGE H. CHADWICK spoke of a trip taken to the top of Slide Mountain, in the Catskills, and of the examination of a mastodon skeleton found near Newburgh, N. Y.

MISS BECKWITH spoke of the Russian Thistle and exhibited specimens. It is spreading in the vicinity of Rochester, being now reported at East Rochester, on the flats near the lower falls, at Despatch, and Lincoln Park.

PRESIDENT FAIRCHILD told of a trip to Kelly's Island, Put-in-Bay, Ohio. The point of interest was a cave found at the depth of twenty-five feet, and wholly lined with celestite crystals. It is large enough to hold twenty people and is effectively lighted by electricity. President Fairchild also spoke of the glaciation of the Corniferous limestone at Kelly's Island, Lake Erie.

OCTOBER 24, 1899.

The meeting was held at the Reynolds Library; PRESIDENT FAIRCHILD in the chair; one hundred sixteen persons present.

MR. J. P. MACLEAN, Librarian of the Western Reserve Historical Society, of Cleveland, Ohio, gave an address upon

THE MOUND BUILDERS.

The lecture was illustrated by numerous lantern slides showing the location, structure, form, and appearance of the more important mounds in Ohio.

A vote of thanks was tendered MR. MACLEAN for his interesting lecture.

NOVEMBER 14, 1899.

The meeting was held at the Reynolds Library; PRESIDENT FAIRCHILD in the chair; seventy-eight persons present.

DR. W. D. MERRELL was elected an active member of the Society.

The REV. E. H. EDSON gave an address entitled:

A SECOND EVENING IN ALASKA.

The lecture was illustrated by lantern slides from photographs made by Mr. Edson, also by a large collection of implements, furs, and curios.

NOVEMBER 28, 1899.

The meeting was held at the Reynolds Library; PRESIDENT FAIRCHILD in the chair; a good audience present.

The paper of the evening was to have been given by PROFESSOR CHARLES WRIGHT DODGE, but he was unable to be present.

PRESIDENT FAIRCHILD made some remarks upon drumlins, speaking of one which seemed to have distinct traces of water-cutting, possibly due to a stream from the receding ice front.

MR. KUICHLING spoke of the destructive force of a comparatively small stream of water. He also asked if a satisfactory explanation had ever been given of the formation of such regularly shaped ponds as the one at Cartersville. PROFESSOR FAIRCHILD gave as the most generally accepted theory for such "Kettles" the melting of blocks of ice which had been buried or surrounded by sand and gravel.

PROFESSOR FAIRCHILD also spoke of sand dunes on the Ridge Road, and the rapidity with which they were built.

DR. CHARLES T. MITCHELL described a phenomenon called by the residents the "tide," which occurs on still nights on Canandaigua Lake. He said that it is noticed chiefly on the west shore of the southern half of the lake. The question of the origin of this wave motion caused an interesting discussion by a number of the members.

DECEMBER 12, 1899.

The meeting was held at the Reynolds Library; PRESIDENT FAIRCHILD in the chair; fourteen persons present.

The paper of the evening was presented by DR. WILLIAM D. MERRELL, of the University of Rochester, entitled:

THE DISCOVERY OF MOTILE ANTHEROZOIDS IN GYMNOSPERMS.

The paper was illustrated by lantern slides.

JANUARY 9, 1900.

The annual meeting of the Academy was held at the Reynolds Library; PRESIDENT FAIRCHILD in the chair; thirty-seven persons present.

The Council report recommended that the Society authorize and empower the Council of the Academy to place the library of the Society upon deposit with the library of the University of Rochester in Sibley Hall, under such conditions as the Council shall deem wise and just for the interests of the Society, provided (1) that the library material shall remain the property of the Academy; (2) that it may be removed from deposit upon proper notice; and (3) that it shall be kept practically distinct from the library of the University.

The recommendation of the Council was approved by the Society.

MR. HERBERT L. TRACY was elected to active membership.

Annual reports of the officers were presented as follows:

SECRETARY'S REPORT.

The Secretary, DR. M. E. LEARY, reported that thirteen meetings had been held during the year, with a total attendance of 949 and average attendance of 79. The number of papers read was nineteen, classified as follows: Geology 3; Bacteriology 2; Entomology 2; Botany 2; Travel 2; and one each on Music, Ornithology, Hygiene, Physics, Ichthyology, Meteorology, Photography, Ethnology.

TREASURER'S REPORT.

The report of the Treasurer, J. E. PUTNAM, stated that receipts for the year amounted to $310.74, and that there was a balance in the treasury of $118.71.

LIBRARIAN'S REPORT.

The report of the Librarian, MISS FLORENCE BECKWITH, was given, as follows :

Since the last annual report 411 volumes, pamphlets and separate publications have been added to the library. One hundred eighty-four (184) of these were received from our regular exchanges in the United States, the balance from scientific institutions and societies in Canada, Mexico, Central America, South America, Austria, Belgium, France, Germany, Great Britain, Holland, Italy, Norway, Portugal, Roumania, Russia, Sweden, Switzerland, Japan, Java and Australia.

From authors of scientific papers we have received 24 publications, and from other sources 23 volumes and pamphlets. Counting by titles 915 publications were received during the year.

The library long ago outgrew the limits of the space granted us in Anderson Hall, and the Librarian is gratified that now, through the action of the Trustees of the University of Rochester and the Council of the Academy, ratified to-night by the action of this Society, the valuable material accumulated will be deposited in the library of the University, where it will be accessible to all who desire to consult the publications.

REPORT OF THE BOTANICAL SECTION.

The report of the Botanical Section was read by the Recorder of the Section, MRS. J. H. MCGUIRE, as follows :

The officers of the Section are : Miss Florence Beckwith, Chairman ; Mr. William Streeter, Vice-Chairman ; Mrs. J. H. McGuire, Recorder.

During the past year the Section has held twenty-six meetings, which occurred every alternate Monday evening at the residence of Mr. William Streeter, No. 14 Scio street, except during the summer months, when, by invitation of Professor C. W. Dodge, the Section met in the Biological Laboratory of the University of Rochester.

The work of the Section for the past year has been as follows:

(1). The collection and identification of rare native plants not hitherto discovered in this district, and finding and recording new stations for others. (2). The collection and identification of Mushrooms. (3). The study of Lichens.

Tussilago was reported in blossom April 4; *Hepatica* April 15; *Saxifraga virginiensis* Michx. and *Anemonella thalictroides* Spach. April 18; and *Claytonia* April 21.

Buttercups, Dandelions, and Sweet Clover were reported in blossom on December 23.

A blossom of *Lobelia cardinalis* L. of pure pink color, growing with hundreds of others of the normal type, was reported from Gates, in this county.

The following new plants were reported during the year:

Trillium cernuum L. (Monroe County); *Silene dichotoma* Ehrh.; *Setaria verticillata* Beauv.; *Agrimonia parviflora* Solander; *Lychnis vespertina* Sibth.; *Physalis philadelphica* Lam.; *Rumex altissimus* Wood; *Setaria verticillata* Beauv.

New stations were reported for the following rare or infrequent plants:

Salsola kali L. var. *tragus* Moq.; *Solanum carolinense* L.; *Pyrus arbutifolia* L. f.; *Salix lucida* Muhl. var.———; *Myrica cerifera* L.; *Pterospera andromeda* Nutt.

Report of the Curator in Botany.

The Curator in Botany, Mr. J. B. Fuller, reported as follows for the year ending Dec. 30, 1899: The only contribution received since my last report consists of six specimens of rare species from the Botanical Department of the Ohio State University.

Of the plants collected by the members of the Botanical Section only 232 have been preserved.

During the year 782 specimens have been mounted, making the total number of mounted specimens in the herbarium 6420.

Mr. M. S. Baxter has classified and arranged the collection of Ferns which Mr. C. W. Seelye presented to the Academy, and finds that there are over 1500, representing 53 genera, 472 species, and 94 varieties.

Our herbarium now contains about 15,000 specimens, embracing 914 genera, 2772 species, and 173 varieties. The discrepancy between these figures and those given in previous reports is accounted for by the fact that Mr. Seelye's collection of Ferns contains over 1500 specimens, instead of 900, as was estimated by the donor.

The following officers were elected for the year 1900.

President, HERMAN LEROY FAIRCHILD.
First Vice-President, GEORGE W. GOLER
Second Vice-President, CHARLES W. DODGE.
Secretary, MONTGOMERY E. LEARY.
Corresponding Secretary, CHARLES W. DODGE.
Treasurer, JOSEPH E. PUTNAM.
Librarian, FLORENCE BECKWITH.
Councillors, { EVALINE P. BALLENTINE, CHARLES T. HOWARD } *1903*

The paper of the evening, read by MR. HENRY L. WARD, was entitled :

METEORITES.

The paper was illustrated by a number of lantern slides.

JANUARY 16, 1900.

A lecture for the benefit of the Academy was given at Music Hall by MR. R. L. GARNER, entitled

IN THE HEART OF THE AFRICAN JUNGLE.

JANUARY 23, 1900.

The meeting was held at the Reynolds Library; PRESIDENT FAIRCHILD in the chair.

MR. H. L. PRESTON announced six new meteorites.

The paper of the evening was read by MR. GEORGE W. RAFTER, entitled :

HOW GENESEE RIVER CANYON HAS BEEN MADE.

The paper was illustrated by a large number of lantern views, many of them taken at the time of the floods in Rochester, in 1865 and 1896.

FEBRUARY 13, 1900.

The meeting was held at the Reynolds Library; PRESIDENT FAIRCHILD in the chair ; one hundred three persons present.

The President read a paper upon the

GLACIAL LAKE HISTORY OF THE GENESEE VALLEY.*

The paper was illustrated by a large number of lantern slides, maps and drawings.

FEBRUARY 20, 1900.

A special meeting of the Academy was held at the Reynolds Library; VICE-PRESIDENT GOLER in the chair ; ninety-six persons present.

MR. J. W. WILSON, of Kingston, Ontario, showed one hundred views of American and Canadian lake scenery, from photographs taken by himself. A vote of thanks was given the lecturer.

FEBRUARY 27, 1900.

The meeting was held at the Reynolds Library; PRESIDENT FAIRCHILD in the chair ; fifty-six persons present.

MR. GEORGE H. CHADWICK read a paper entitled

SHELLS—CURIOUS, FAMILIAR, USEFUL.

The paper was illustrated by about three hundred beautiful and interesting shells.

MARCH 13, 1900.

The meeting was held at the Reynolds Library; PRESIDENT FAIRCHILD in the chair ; ninety-six persons present.

PROFESSOR I. P. BISHOP, of Buffalo, N. Y., gave a lecture upon the

GEOLOGY OF ROCK SALT IN NEW YORK STATE.

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* The substance of this paper is published in the Bulletin, *Geol. Soc. Amer.*, Vol. 7, 1896, pp. 423-452.

The lecture was illustrated by a large number of lantern views. A vote of thanks was given Professor Bishop.

MARCH 27, 1900.

The meeting was held at the Reynolds Library; PRESIDENT FAIRCHILD in the chair ; fifty-six persons present.

The paper of the evening was given by DR. JOHN M. CLARKE, State Paleontologist, Albany, N. Y., and was entitled:

GEOLOGICAL HISTORY OF PARASITISM.

The paper was illustrated by a large number of lantern views. A vote of thanks was given Dr. Clarke.

APRIL 10, 1900.

The meeting was held at the Reynolds Library; PRESIDENT FAIRCHILD in the chair ; ninety-seven persons present.

MRS. A. L. DIMMOCK and MR. ORIN PARKER were elected active members of the Academy.

DR. JOHN M. CLARKE, Albany, N. Y.; PROFESSOR B. E. FERNOW, Ithaca, N. Y., and PROFESSOR IRVING P. BISHOP, Buffalo, N. Y., were elected corresponding members.

MR. H. K. PHINNEY spoke of the deaths of George H. Danforth, Hon. Theodore Bacon and Mr. J. G. Glen, members of the Academy who had lately passed away.

PROFESSOR B. E. FERNOW, of Cornell Univèrsity, Ithaca, N. Y., gave a lecture upon

THE EVOLUTION OF FOREST GROWTH.

The lecture was illustrated by lantern views.

MAY 8, 1900.

The meeting was held at the Reynolds Library; PRESIDENT FAIRCHILD in the chair ; fifty-seven persons present.

MR. JOHN R. KEY, of Buffalo, N. Y., gave a lecture upon

COLORED PHOTOGRAPHY DIRECT FROM NATURE BY THE McDONOUGH METHOD.

The lecture was illustrated by a large number of lantern views.

MAY 22, 1900.

The meeting was held at the Reynolds Library; the President in the chair ; forty-seven persons present.

A vote of thanks was tendered MR. JOHN R. KEY for his lecture on the 8th inst.

PRESIDENT H. L. FAIRCHILD read papers on

PECULIAR DRUMLINS IN THE GENESEE VALLEY.
MEDINA SANDSTONE STRUCTURE.*

Both papers were illustrated by lantern views, maps and charts.

JUNE 19, 1900.

The meeting was held at Anderson Hall; PRESIDENT FAIRCHILD in the chair ; about one hundred fifty persons present.

MISS FANNIE MONTGOMERY, MISS J. B. SPENCER and DR. W. V. EWERS were elected active members of the Academy.

This being the annual public meeting of the Botanical Section, the President placed the meeting in the hands of MISS BECKWITH, the Chairman of the Section.

The work of the Section for the last few months had been largely devoted to the study of lichens, and they formed the topic of interest for this meeting. The paper of the evening was by MRS. WILLIAM STREETER, and was entitled :

LICHENS.

Several collections of lichens were shown, including one made by Dr. Samuel Bradley, in 1816 ; forty-six named species contributed to

* The paper is printed in the *American Geologist*, Vol. 28, July, 1901, pp. 9-14.

the herbarium of the Academy by Mr. E. L. Hankenson, of Newark, N. Y.; some collected by Judge Clinton of Buffalo, N. Y.; a number collected by Mr. A. J. Perkins in the Yosemite at an elevation of 4,000 feet; and others collected in this vicinity by members of the Section.

The most interesting exhibit was a collection of arctic lichens gathered by Lieut. Frederick F. Kislingbury, second in command of the Greely expedition. These specimens were gathered at Distant Cape on June 8th, 1882. After lying in the arctic regions for eighteen years, they were forwarded by Captain Peary on dog sleds 250 miles to the coast, and finally reached the hands of the brother of Lieut. Kislingbury, Mr. John P. Kislingbury, of this city, who kindly presented them to the Academy.

MR. WILLIAM STREETER made a few remarks upon this gift, as follows:

"Those of us who have been associated with the Academy of Science, and especially with the Botanical Section, for many years, will recall with sorrow the sad fate of that brave and gallant officer and scientist, Lieut. Kislingbury. This Section was already under obligation for a collection of wild flowers made by this officer on the ill-fated Greely expedition, and presented by his brother to the Academy. And now we are still further indebted for a similar collection of Lichens, which in themselves make a pathetic appeal to every one at all interested in science for remembrance of that able and energetic explorer and collector.

"That these relics, after remaining in such an inaccessible place for eighteen years, should at last be recovered by Captain Peary and find their way to friends as a message from the dead seems little less than a miracle. And the excellent condition of these specimens, collected and preserved with so much care, testifies to the skill and devotion to science of the brave explorer, even while facing untold peril and in direst extremity. We cannot look upon this collection without a feeling of respect and reverence for the one whose labor and suffering made such a contribution to science possible."

Sections of lichens showing their structure, spores, and fruit, were exhibited by MR. STREETER and MR. BAXTER, with the aid of a large number of microscopes, and charts prepared by MR. and MRS. A. J. PERKINS showing on an enlarged scale *Usnea barbata* and *Graphis scripta*, served to made clear the reciprocal relations of algal and fungal tissues.

Some of the rarer native plants exhibited were *Arethusa bulbosa* L., *Calopogon pulchellus* R. Br., *Pogonia ophioglossoides* Nutt., *Triglochin palustris* L., *Tofieldia glutinosa* Willd., *Linnæa borealis* Gronov., *Habnaria dilatata* Gray, *Spiranthes latifolia* Torr., and *Ledum latifolium* Ait.

A gigantic specimen of seaweed from the Pacific coast, presented to the Academy by PROFESSOR HENRY A. WARD, attracted much attention, and a fine display of cultivated plants from the parks added much to the pleasure of the evening.

OCTOBER 23, 1900.

The meeting was held at the Reynolds Library; PRESIDENT FAIRCHILD in the chair; thirteen persons present.

The President spoke briefly of his summer's work tracing the Iroquois shoreline in Jefferson county, and the Whittlesey and Warren shorelines in Cattaraugus and Chautauqua counties. In the two counties last named particularly fine glacial stream channels were observed.

MR. H. K. PHINNEY spoke of observations made on the road which is the extension of Hudson Avenue from Norton street to the Ridge. This road has lately been graded down through a cliff which was the actual shore of Lake Iroquois, the predecessor of Lake Ontario, making a section ten feet in depth and several rods long. The section is of decomposed shale interbedded with thin layers of limestone, and several features suggest that the decomposition of the shales began in preglacial time.

MR. PHINNEY exhibited specimens of peat derived from sphagnum moss, which were taken from pits dug for the foundations of the new building of the Mechanics Institute, at the corner of Plymouth avenue and Spring street. He stated that shell marl had been found under the peat, and above both were five feet or more of swamp muck and an equal depth of made soil. Old maps of Rochester show that a spring was situated on the south side of Spring street at this point, and that a brook ran from it northward across Main street, flowing into the river at Platt street. The marl and peat show that there was once a pond here which was filled up by vegetable growth and silting

until it became a marsh, which the early settlers still further filled up to build upon.

In discussing the subject DR. PORTER FARLEY said that his mother, an old resident, had often spoken of this part of the city as being a swamp as late as 1837 or 1838, and of epidemics starting from this locality.

MR. S. G. CRUMP exhibited some very interesting Indian relics. One was a pipe of soapstone representing a human figure kneeling with the pipe bowl on his back. The figure is represented in the act of drawing down a mask, revealing a dog's face. The relic was remarkable for the very high degree of polish which it showed. The pipe was found by Mr. Frank Pugsley in a graveyard near West Henrietta.

Another relic found on a farm in Mendon, was a "bird stone" of banded slate. The specimen was absolutely perfect, an unusual circumstance. Mr. Crump also exhibited a fine specimen of jasper conglomerate found by him near West Bay City, Michigan.

MR. PHINNEY called attention to the fact that the Academy had lost another member by death, Mr. Ezra R. Andrews, paying a high tribute to his personal character, speaking of his interest in all the good works of the city, particularly those of a philanthropic nature, and of the great loss which the community had sustained.

NOVEMBER 13, 1900.

The meeting was held at the Reynolds Library; the President in the chair; thirteen persons present.

PRESIDENT FAIRCHILD gave a paper entitled:

NEW DATA RELATING TO THE ICE RECESSION IN NEW YORK STATE.

(The substance of this paper is published in the 22d annual report of the New York State Geologist and other papers there noticed.)

NOVEMBER 23, 1900.

The meeting was held at the Reynolds Library; VICE-PRESIDENT CHARLES WRIGHT DODGE in the chair; thirty-eight persons present.

The paper of the evening was read by DR. LOUIS A. WEIGEL, and was entitled :

SOME POINTS IN THE DIAGNOSIS OF BONE TUBERCULOSIS.

The paper was illustrated by lantern slides and radiograph.

COL. S. P. MOULTHROP exhibited the femur from a skeleton found in a sand pit about two miles from Garbutt, N. Y. Five skeletons were found which he thought were prehistoric.

DECEMBER 11, 1900.

The meeting was held at the Reynolds Library; MR. E. A. FISHER in the chair; twelve persons present.

The Council recommended for election as Fellows of the Society DR. W. D. MERRELL and PROFESSOR E. HOWARD EATON. Under the rules the nominations were laid on the table until the next business meeting.

MR. H. L. PRESTON exhibited a section of a new meteorite which he had named Niagara.*

MR. PRESTON also exhibited a large number of American gems, cut and uncut garnets, rubies, topazes, etc.

MR. C. J. SARLE described some geological studies which he had made on coral reefs in the Clinton strata.†

MR. J. G. D'OLIER exhibited some interesting "water-washed" stones and read a letter from Dr. W J McGee expressing his opinion with regard to them. Mr. D'Olier also exhibited some Indian relics collected near Richmond Mills, and a curved flint knife found at Conesus Lake.

JANUARY 7, 1901.

The meeting was held at the Reynolds Library; VICE-PRESIDENT GOLER in the chair; ten persons present.

* Described in the *Journal of Geology*, Vol. X; No. 5, 1902.

† The matter of this communication is printed in the *American Geologist*, Vol. 28, Nov. 1901, pp. 282-299.

As there was not a quorum present, the regular business of the annual meeting was postponed until January 22d.

PROFESSOR C. W. DODGE exhibited a number of butterflies and moths mounted on tablets.

JANUARY 22, 1901.

BUSINESS OF THE ANNUAL MEETING.

The adjourned meeting was held at the Reynolds Library; PRESIDENT FAIRCHILD in the chair; twenty-two persons present.

Reports of officers for the past year were presented as follows :

SECRETARY'S REPORT.

The President made an informal report for the Secretary that 18 meetings had been held during the past year, at which eight papers in geology had been read, two in geography, and one each in conchology, forestry, biology, photography, botany, medicine, crystallography and archæology.

CORRESPONDING SECRETARY'S REPORT.

The Corresponding Secretary, PROFESSOR CHARLES WRIGHT DODGE, reported that all correspondence addressed to the Corresponding Secretary during the year had been properly attended to, and there were no matters in arrears.

The present list of Honorary Members includes eight names, the number having remained unchanged throughout the year.

There at present forty-two Corresponding Members as against forty-four last year. The change is due to the death of Mr. E. L. Potter and to the return to Active membership of Mr. E. Howard Eaton.

LIBRARIAN'S REPORT.

The Librarian, MISS FLORENCE BECKWITH, reported as follows :

During the year 1900 there were contributed to the library of the Academy 1156 volumes, parts of volumes, pamphlets, and separate

publications. The greater number of these were received from our regular exchanges, and are accredited as follows :

United States	547	Italy	62
Canada	59	Norway	17
Mexico	25	Portugal	7
Central America	2	Roumania	1
South America	55	Russia	39
Austria and Hungary	18	Sweden	8
Belgium	14	Switzerland	19
Denmark	1	Japan	1
France	57	Java	1
Germany	103	Australia	19
Great Britain	39	From authors	32
Holland	6	Miscellaneous	24

Forty-three bound volumes were received during the year, all from American exchanges, except one from Canada.

Last year arrangements were made with the Trustees of the University of Rochester to take the library of the Academy, catalogue the books and place them upon their shelves, members of the Academy and the public to be allowed to use them upon the same conditions as the books belonging to the library of the University. Owing to contemplated changes in the manner of cataloguing, all of our books have not yet been listed, and we have not been permanently located. It is probable, however, that arrangements will soon be made so that our valuable scientific material will be more available to the members of the Academy than it has been up to the present time.

From small beginnings the library has steadily increased, until it has become large and valuable. Each year some new scientific societies and institutions have been added to our exchange list. As the library has increased, so also has the labor of caring for it, and the present librarian feels compelled to resign the office on account of not having time to devote to it. But, after six years of service, it is with real regret that she lays down the work.

The report of the Botanical Section was read by the Recorder, Mrs. J. H. McGuire.

Report of the Botanical Section.

The officers of the Section are: Miss Florence Beckwith, Chairman; Mr. William Streeter, Vice-Chairman; Mrs. J. H. McGuire, Recorder.

Twenty-three regular meetings were held during the year, and a public meeting at Anderson Hall, University of Rochester, June 19, 1900.

Buttercups were reported in blossom on January 7; Maples in blossom April 6; *Tussilago* April 9; Hepaticas and Dandelions April 15.

Several specimens of *Trillium grandiflorum* Salisb. showing peculiar variations were exhibited by Mr. F. W. Ross. In one the petals were all green; in another the petals were green but streaked with white; another had only a blossom on the stalk, no leaves; and another had leaves with long petioles.

A Dandelion leaf twenty-one inches long and six inches wide was exhibited by Miss Beckwith.

The following new plants were reported during the year:

Draba verna L.; *Solidago bicolor* L. var. *concolor* Torr. & Gray; *Bellis perennis* L; *Coreopsis tinctoria* Nutt.; *Pycnanthemum linifolium* Pursh.

New stations were reported for the following rare or infrequent plants:

Strophostyles angulosus Ell.; *Gaura biennis* L.; *Mentha citrata* Ehrh.; *Ranunculus flammula* L. var. *reptans* E. Meyer; *Potentilla palustris* Scop.; *Peltandra undulata* Raf.

The work of the year was almost entirely devoted to the study of Lichens. Many specimens were examined and identified.

Professor Charles Wright Dodge, Curator of Biology, reported that the collections intrusted to his care are in good condition, and are displayed in the zoological collection of the University of Rochester. There have been no accessions during the past year.

Mr. C. J. Sarle, Curator in Geology, made an informal report, and Miss Beckwith made a brief informal report for the Curator in Botany, Mr. Fuller.

Mr. E. Howard Eaton and Dr. W. D. Merrell were elected Fellows of the Society, and Miss M. H. Harris an active member.

The following officers were unanimously elected for the ensuing year:

President, HERMAN L. FAIRCHILD.
First Vice-President, GEORGE W. GOLER.
Second Vice-President, SHELLEY G. CRUMP.
Secretary, MONTGOMERY E. LEARY.
Corresponding Secretary, CHARLES WRIGHT DODGE.
Treasurer, JOSEPH E. PUTNAM.
Librarian, WILLIAM D. MERRELL.
Councillors, { CHARLES R. SUMNER, FLORENCE BECKWITH. } *until 1904.*

MR. JAMES B. MORMAN read a paper entitled

THE DETERMINATIVE FACTOR OF ORGANIC EVOLUTION.*

The paper was discussed by PRESIDENT FAIRCHILD and DR. W. D. MERRELL.

FEBRUARY 12, 1901.

The meeting was held at the Reynolds Library; PRESIDENT FAIRCHILD in the chair; one hundred two persons present.

PROFESSOR I. P. BISHOP, of Buffalo, N. Y., gave a lecture entitled

THE LAND OF THE MIDNIGHT SUN.

The lecture was illustrated by a large number of lantern views from photographs taken by him during his trip to Norway the previous summer.

FEBRUARY 26, 1901.

The meeting was held at the Reynolds Library; VICE-PRESIDENT GOLER in the chair; ninety-eight persons present.

PROFESSOR CHARLES WRIGHT DODGE read a paper entitled

LIFE AND DEATH.

*The matter of the paper is contained in a book entitled "Principles of Social Progress: a Study of Civilization." James Bale Morman, Rochester, 1901.

MARCH 12, 1901.

The meeting was held at the Reynolds Library; PRESIDENT FAIRCHILD in the chair ; sixty-nine persons present.

The report of the Council announced the following appointment of committees :

Finance—Messrs. Davison, Fairchild, Sumner, Kuichling, Putnam, Crump and Leary.

Library—Dr. Merrell, Miss Beckwith, Dr. Ballantine, Professor Dodge, Mr. Davison, Dr. Howard.

Publication—Dr. Leary, Professor Fairchild, Miss Beckwith, Professor Dodge, Dr. Goler.

The following Curators were appointed :

In Botany—Joseph B. Fuller.
In Conchology—John Walton.
In Entomology—Charles T. Howard.
In Geology—C. J. Sarle.

AGNES M. STEWART, SANDERSON SMITH and S. C. FAY were elected active members of the Academy.

The paper of the evening was presented by HENRY C. MAINE and C. C. LANEY, and was entitled

LANTERN STUDIES OF OUR NATIVE ELMS AND OTHER TREES.

The paper was profusely illustrated by lantern views of many beautiful and historic trees of this vicinity and elsewhere.

MARCH 26, 1901.

The meeting was held at the Reynolds Library ; PRESIDENT FAIRCHILD in the chair ; thirty persons present.

MR. SANDERSON SMITH gave an informal talk about his experiences while with the U. S. Fish Commission, describing the great cuttlefish and other peculiar fishes of the sea.

APRIL 9, 1901.

The meeting was held at the Reynolds Library; PRESIDENT FAIRCHILD in the chair; thirty-six persons present.

MR. SANDERSON SMITH gave a paper on

DEEP SEA DREDGING.

The paper was discussed by PRESIDENT FAIRCHILD, PROFESSOR HENRY A. WARD, MR. S. C. PIERCE, PROFESSOR C. W. DODGE, MISS EDITH BRACE and others.

APRIL 23, 1901.

The meeting was held at the Reynolds Library; PRESIDENT FAIRCHILD in the chair; seventy-four persons present.

MR. A. D. FISK, of the Eastman Kodak Company, gave a talk on

THE WONDERS OF PHOTOGRAPHY.

Illustrated by experiments and lantern views.

MAY 14, 1901.

The meeting was held at the Reynolds Library; PRESIDENT FAIRCHILD in the chair; ninety-eight persons present.

MR. G. H. CHADWICK reported the occurence at Rochester of the European slug, *Arion hortensis*, Fér.

PROFESSOR CHARLES WRIGHT DODGE gave a lantern lecture entitled

THE STRUCTURE AND LIFE OF BIRDS.

The illustrations were from photographs taken from life.

MAY 28, 1901.

The meeting was held at the Reynolds Library; PRESIDENT FAIRCHILD in the chair; forty-three persons present.

The President gave an illustrated lecture entitled

CYCLONIC STORMS AND ROCHESTER WEATHER.

By Herman L. Fairchild.

CONTENTS:

CLIMATE AND WEATHER.

The atmospheric conditions of any place or region when averaged through a long period of time are called the "climate." In other words climate is the average value of the meteorological elements of the place. Thus we say that a certain locality has a hot or a cold climate, or wet or dry, according as the average conditions of the locality vary from the normal for that latitude, or for the continent.

"Weather" is the term applied to the changing or fluctuating conditions of the atmosphere, the succession of phenomena, during short periods of time. Localities may have "climate" and not have "weather." Rochester has both. Places which have only two seasons during the year, perhaps a wet season and a dry season, with the atmospheric conditions repeated day after day during each season, have, speaking correctly, only climate. The people of such regions do not have one prolific topic of small talk which helps to make life worth living. Rochester has an abundance of "weather," or frequent changes in the conditions of the atmosphere, and yet has at the same time one of the most equable and finest continental climates in the world. The daily changes here are not great for a continental climate, and the seasonal averages are near the normal. We will make some comparisons below.

METEOROLOGICAL ELEMENTS.

The elements of meteorology which make climate are: (1) Temperature; (2) moisture, in varied forms as invisible vapor, dew, fog,

frost, rain, snow, hail; (3) evaporation; (4) cloudiness; (5) wind; (6) barometric pressure, or the varying weight of the atmosphere. The last has little direct or visible effect upon climatic conditions, but it has great indirect effect by its control of the other elements.

The many combinations of these elements in their varied intensity produce the many kinds of climate and weather which give variety to the physical conditions of the world.

TYPES OF CLIMATE.

The two main types of climate are the continental and the oceanic. The continental type is characterized by extremes of temperature and by great differences in the element of moisture and the distribution of precipitation. The oceanic type has comparative uniformity; small differences between winter and summer, on account of the great thermal capacity of water and its function of distributing and equalizing temperature. A few figures in comparison of the two climatic types will be interesting.

Temperature.

	Average Maximum.	Average Minimum.
Equatorial Seas	90, and less	68
Northern Continents	113	−40

Absolute maximum for Continent, 122 in Sahara and Death Valley.
" minimum " " −72 in N. A., −88 in Siberia.

Monthly Averages of Temperature.

Place.	Highest.	Lowest.	Amplitude.
Key West,	84.3 (Aug.)	69.7 (Jan.)	14.6
St. Paul,	71.9 (July)	11.7 (Jan.)	60.2
Ft. Conger,	37.1 (July)	−40.1 (Feb.)	77.2
Death Valley,	102. (July)	?	?
Yakutsk, Sib.	65.8 (July)	−45.0 (Jan.)	110.8

Normal Yearly Amplitude.

North America,	153
Asia,	171
South America,	81
Equatorial Ocean,	18

Rochester lies so far inland that it might be expected to have a mid-continental climate, with the usual extremes of temperature and rainfall, but we find that it has an unusually moderate climate in all

elements. This will be shown by comparison with other typical localities in the United States.

Coast cities, as Boston and New York, while not subjected to the extremes of temperature, suffer rapid and severe changes caused by the sudden shifting of winds between land and water, since they lie in the belt of conflict between oceanic and continental conditions.

STATISTICAL COMPARISONS.

Temperature.

Place.	Seasonal Averages. Spring.	Summer.	Autumn.	Absolute Extremes. Winter.	Highest.	Lowest.	Yearly Average.
Rochester,	44	69	51	26	99	−12*	47
Buffalo,	42	68	50	26	94	−14	46
Chicago,	45	70	52	25	100	−23	49
Boston,	45	69	52	29	102	−13	49
Omaha,	41	74	52	24	105	−32	50
St. Vincent,	35	63	38	0	103	−54	34
Los Angeles,	60	70	65	55	108	28	52
San Francisco,	55	59	59	51	99	29	56

Spring and Autumn Averages.

	March.	April.	May.	Nov.	Dec.	Mean of Year.
Rochester,	30	43	56	41	29	47
Omaha,	35	51	62	37	27	50

Precipitation.

Averages for Wettest and Dryest Months, in Inches.

Locality.	Highest.	Lowest.	Range.
Rochester,	3.34 (May)	2.44 (Sep.)	0.94
Boston,	4.60 (Nov.)	3.00 (Sep.)	1.60
New York,	4.80 (Aug.)	3.00 (May)	1.80
Buffalo,	3.80 (Oct.)	2.40 (Apr.)	1.40
Chicago,	3.70 (July)	2.20 (Dec.)	1.50
Omaha,	5.70 (July)	0.70 (Feb.)	5.00
Los Angeles,	4 00 (Feb.)	trace (July)	4.00
San Francisco,	5.30 (Dec.)	trace (July)	5 30
Portland,	8.00 (Dec.)	0.60 (July)	7.40
St. Vincent,	3.70 (July)	0.60 (Win)	3.10
Tatoosh,	14.40 (Dec.)	2.10 (July)	12.30
Yuma,	0.60 (Feb.)	trace (May)	0.60

*A lower absolute minimum was established in January, 1904, by a record of −14.

Locality.	Percentages of Seasonal Distribution. Spring.	Summer.	Autumn.	Winter.	Variation.
Rochester,	26	26	24	26	2
Boston,	24	24	25	27	3
New York,	24	28	24	24	4
Buffalo,	21	26	28	25	7
Chicago,	26	30	25	10	11
Omaha,	28	43	26	6	37
Los Angeles,	21	2	13	64	62
San Francisco,	25	0	17	58	58
Portland,	24	6	24	46	40
St. Vincent,	20	45	12	12	33

Average Rainfall, in inches.

	Spring.	Summer.	Autumn.	Winter.	Total
For the whole United States,	9	10	8	9	36
Rochester,	9	9	8	9	35
Tatoosh, Wash.,	21	10	33	36	100
Yuma, Ariz.,	0.3	0.2	0.3	1.5	2.3

Probability of Rainy Days (percentage).

	Highest.	Lowest.
Rochester,	65 (Jan.)	32 (Aug.)
Boston,	41 "	33 "
San Francisco,	41 "	33 "
Portland,	65 "	13 "

Greatest Daily Rainfall, in inches.

Rochester,	4.19,	August 19, 1893
Alexandria, La.,	21.00,	in two days.
Helena, Ark.,	12.00,	in forty hours.
Mayport, Fla.,	14.00,	in one day.
Hatteras, N. C.,	9.00,	"
New Orleans,	9.00,	"
Ft. Wallace, Kan.,	9.00,	"

Cloudiness.

Average of extremes, in percentage.

	Highest.	Lowest.
Rochester,	83 (Dec.)	44 (Aug.)
Boston,	56 (Dec.)	51 (Aug.)
Yankton,	51 (Mar.)	39 (Sept.)
San Francisco,	48 (Jan.)	32 (Oct.)
Portland,	72 (Jan.)	35 (Aug.)

Seasonal Distribution; percentage.

	Spring.	Summer.	Autumn.	Winter.	Average.
Rochester,	55	47	60	75	59
Boston,	54	46	51	53	51
St. Paul,	51	46	52	49	50
Yankton,	52	42	41	47	46
San Francisco,	43	43	35	47	42
Portland, O.,	54	44	55	72	56

Percentage of Sunshine.

	Spring.	Summer.	Autumn.	Winter.	Annual Average.
Rochester,	53	62	44	30	47

Rochester Skies.

Average number of clear, partly cloudy and cloudy days.

	Clear.	Partly Cloudy.	Cloudy.
Spring,	23	33	36
Summer,	32	38	22
Autumn,	21	30	40
Winter,	8	25	57
	84	126	155

DISCUSSION OF ROCHESTER DATA.

The Rochester data in the tables above are based upon the Weather Station records of the last 25 to 30 years.* Their range of error is small and they are practically reliable. When everything is taken into account they make a remarkably favorable showing for this city.

In the three most important elements of climate, those which have most direct and immediate effect upon industries, including agriculture, and upon personal comfort, Rochester is especially favored. These are temperature, precipitation and winds.

Temperature:—Probably no other inland city near the same latitude has such moderate temperature as Rochester. When we consider the intense summer heat of most inland places, and the very severe winter cold, the latter being carried far south in the Mississippi valley, the exemption of our city becomes apparent. Even Washington, lying so near the sea and far southward, has a much lower minimum record than Rochester. The higher yearly averages of many cities is produced by the undesirable summer heat. Seasonal or

* The writer is indebted for a large part of the data contained in the above tables to Mr. Orin Parker, the Weather Observer in charge of the Rochester station. Many of the figures and facts of this paper will be found in a paper published by Mr. Parker in the Proceedings of the Rochester Academy of Science, Vol. 3, page 221, March, 1900.

monthly averages are better index of the true temperature, and the tables show that no inland city has greater uniformity. The coast cities excel in this respect, but their superiority in this is neutralized by defects in other elements, as will appear later.

Precipitation:—The average annual precipitation of the whole country is 36 inches. Rochester has 35 inches. Not only is the total fall the proper amount but it is very evenly distributed through the year, as evenly indeed as can be shown without using fractions. The lowest seasonal fall is in the autumn when it is least needed. A comparative analysis of the figures in various ways only confirms the statement that in that very important element of climate Rochester's record is the ideal. In saying this it is assumed that a well distributed rainfall is desirable. No place has an ideal climate which has its rainfall concentrated in a portion of the year, like Los Angeles, for example. Of course the people and the industries become adjusted to their climatic conditions and they may become perfectly satisfied with or even praise a climate with some very defective conditions. But statistical records give the truth, instead of personal impressions and memory, and no amount of grumbling by Rochesterians can deny the fact, as shown in the tables, that in the total precipitation we have the ideal condition. We do not have to resort to irrigation to carry on agriculture, nor make special provision against drought on the one hand, and cloudbursts on the other.

Winds:—In the element of winds Rochester is also favored, the records showing decided moderation. The region is protected from severe gales.

Cloudiness:—There are two elements wherein Rochester appears at a disadvantage. One is the cloudiness, the other the large number of rainy days. These are essentially one condition which is expressed by saying that our skies are relatively gray and somber, especially during the autumn and winter.

In the case of the large percentage of rainy days the figures are to some degree misleading, since they do not discriminate between actual storms and mere snow flurries or rain sprinkles amounting to 0.01 inch. The stormy-day record is largely increased by the frequent light lake snows of the colder months, which scarcely interfere in any wise with either business or pleasure.

Granting it true that we have frequent rains and a high percentage of cloudiness, what can be said in reply to the Rochester grumbler? Just this; that upon the whole the cloudiness which we

have is a distinct advantage. Astronomy is not an important industry here. The advantages are much greater than the disadvantages. The latter are chiefly a matter of imagination or sentiment; the former are real. The clouds interfere but little with most occupations, and not as much with the real comfort of people as they think. Continuous clear skies in summer are not desirable. Clouds not only temper the heat but add a beauty and variety to nature which nothing else can supply. We can not have the splendor of the evening clouds and the grandeur of the thunder storm without having sometimes an excess of cloudiness. The degree of summer cloudiness is wholly an advantage and benefit. The somber skies of the colder months may be an æsthetical or sentimental disadvantage, but they are practically beneficial in conserving heat and preventing low temperatures, specially at night.

Mr. Parker writes:—"Half the beauty of the world is in its "clouds. An unchanging brazen sky is one of the most tiresome "things in nature, and prevents the following of steady occupations "with satisfaction because of its oppressive monotony. In winter the "canopy of clouds protects us from cold as effectually as the blankets "on our beds, and is worth to Rochester thousands of dollars in the "saving of coal and clothing."

Changes:—The climate of Rochester has unquestionable superiority in the moderate temperature, the normal and well distributed precipitation, and the absence of severe winds. The excess of cloudiness and stormy days is not really disadvantageous. There is, however, another condition which requires explanation, the frequent changes in wind direction and temperature. This changeability, however, is not at all peculiar to Rochester but pertains to all the northern and eastern parts of the United States, and especially to the region of the lower Great Lakes. These changes are due to cyclonic storms, which are the most interesting atmospheric phenomena of middle latitudes.

CYCLONES.

The word "cyclone" is a generic term, applied by meteorologists to any vortical movement of the atmosphere. The destructive cyclones of the West Indies are called Hurricanes, those of the Asiatic seas are Typhoons, the terrible whirlwinds of the Mississippi valley are minor whirls within the cyclone and are called Tornadoes. Like thunderstorms, to which they are allied phenomena, tornadoes occur most frequently in the southeast quadrant of the cyclone. The dust

whirls which we see in the streets on a breezy day are similar phenomena in miniature.

To the cyclones we are indebted for the extreme changeableness of our weather, if not to the existence of any "weather" whatever. They are very powerful, wonderful and interesting phenomena. A general understanding of their character and movements gives a new source of interest in nature, and the weather becomes a subject of fascinating study, as a matter of obedience to physical laws and not, as formerly regarded, a mere chance or haphazard thing. "The wind bloweth where it listeth * * * " is not true today, for we know the laws which control the atmospheric movements, and within rather narrow limits we can predict the changes. The telegraph enables us to quickly collect the weather data from any number of stations over the continent, and from the daily or semi-daily comparison we can prognosticate for one or two days ahead.

Cyclones are ascending vortices of warm and lighter air. They originate in regions where the lower air becomes heated by contact with the heated earth surface. The effort of the lighter air to break through the overlying cooler layer produces a vortex which is partly illustrated in a contrary direction by the whirl of water running down through a hole. In the northern hemisphere the cyclones have a contra-clockwise revolution, (Figure 1) while their progression or direction of passage (translation) across the continent is generally eastward, in the great earth-encircling current of middle latitudes (Figure 2). The barometric pressure in the cyclone decreases toward the center, which is called the "low." On the weather maps the different pressures, or barometric gradient, are shown by the lines of equal pressure, called "Isobars." These represent differences of one-tenth of an inch of the mercury column, and properly form concentric circles (Fig. 2). The cyclones may have a breadth of even 1000 or 1500 miles, covering half the width of the continent. In the velocities of rotation and progression, and in all other respects, they greatly vary.

Surrounding the cyclones are areas of descending cold and heavy air. The mass of heavy, cold air following after the cyclone with a generally clock-wise movement is called the "anticyclone" and is the "cold wave" with high pressure. On the maps the centers are marked "highs." When the cyclonic movements are active, in the winter months especially, these "lows" and "highs" chase each other in more or less regular succession across the continent.

A steadily falling barometer indicates the approach of a "low,"

or cyclonic center. The changing wind direction may indicate the same, and by watching the wind direction alone we can closely estimate the direction of the storm center. In the charts showing the laws of cyclonic movement it will be seen that the winds within the cyclone move in general along the isobars, but curving obliquely inward toward the center of the whirl. When one stands facing the wind the cyclonic center is on the right hand and somewhat backward.

On the eastward or advancing side of the cyclone the winds are southerly, warm and moist. On the western or retreating side of the whirl the winds are from the north or northwest and cold and drying. By noting with some care the direction of the wind at any time one can judge the direction from the observer of the cyclonic center. By watching the changes in the wind direction one can judge approximately the path of the cyclone or the direction of its progression. The diagram of wind directions within the cyclone, figure 1, will illustrate this.

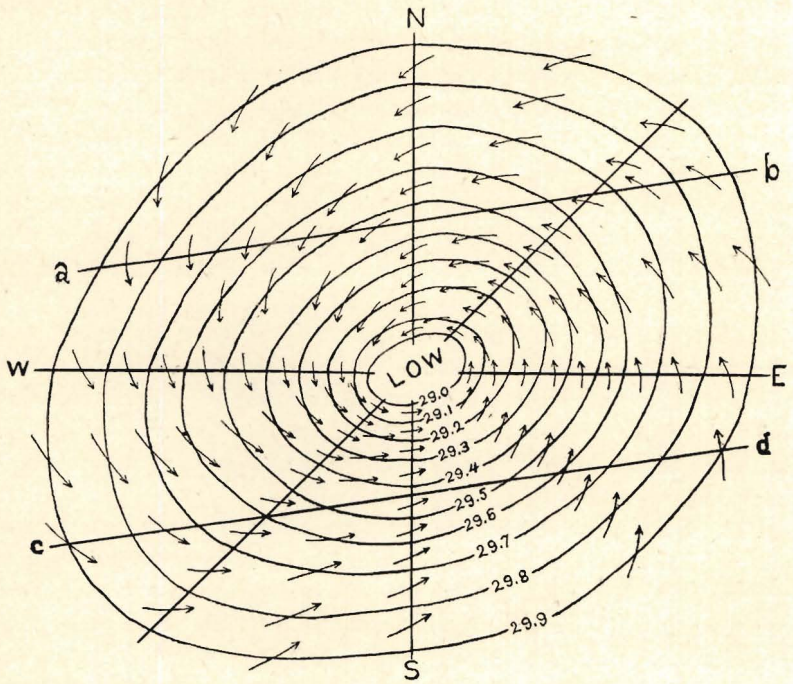

FIG. 1. Diagram showing the theoretical wind directions within the cyclone. The arrows fly with the winds. The concentric lines are isobars (*isobarometrics*) or lines of equal air pressure, drawn for tenths of inches of the mercury column.

If the center of the cyclone passes over the observer the wind directions will be as follows :

With eastward progression of the storm the winds will be southeast to south to the calm of the storm center and then north, with a slight shifting to northwest on account of the vortical character of the great whirl, as indicated in the diagram.

With northward progression the wind will be northeast to east and will change to the opposite direction.

With northeast progression the winds will begin and continue southeasterly until the center passes, when the winds shift suddenly to the opposite quarter.

In cases when the center of the cyclone center passes to the south of the observer and he is located on the line of progression a-b the wind slowly shifts from southeast through east, northeast to north. That is the cloud motion ; but the weather-vane first points to the southeast and veers about with the head eastward and northward. On the other hand, if the cyclonic center passes to the north, or the observer, for example, is situated along the line c-d, the wind shifts in the direction opposite to the former case, and the weather-vane points through south and southwest directions.

By noting both wind directions and changes in the barometric pressure the observer has quite definite knowledge of the cyclone's progress. And if to the personal observations there can be added the information given on the day's weather map, the knowledge of the storm is sufficient to base a prediction with some assurance on the immediate movement and behavior of the whirl.

The region of lake Ontario and the St. Lawrence lies in the path of more cyclones, probably, than any other district in the world. The winter whirls which cross the continent, following in general the parallels of latitude, pass over the great lakes and move off down the St. Lawrence to the north Atlantic, where they usually die out, but sometimes push on to Europe. (Figure 2).

There are other less frequented paths in the United States, one from the Texas and lower Mississippi region, one from the gulf district and one along the Atlantic coastline, which is followed by the West Indian storms. The map, figure 2, shows how these three paths converge in our region.

Since the beginning of this year (1901) the cyclones have been behaving in an unusual manner. Instead of rapidly moving off the

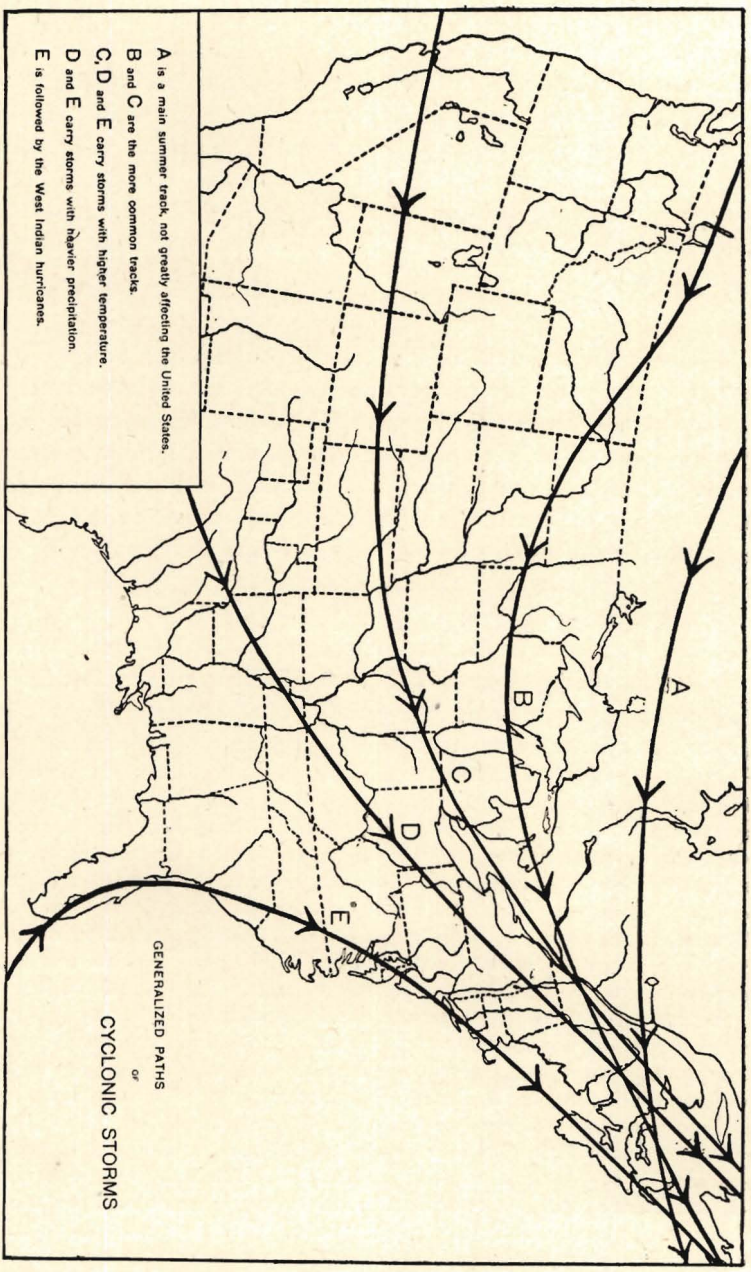

FIG. 2. Map showing the more common tracks of cyclones, and their concentration toward the northeast.

30, PROC. ROCH. ACAD. OF SC., Vol. 3, June 5, 1906.

St. Lawrence gulf region to the north Atlantic they have sometimes lingered on our Atlantic coast, and even retreated a short distance. The reason seems to be that instead of the great area of low barometer lying over the north Atlantic, as usual in winter, it has been lying nearer our east coast, while a great "high" area has held over the north Atlantic and western Europe. (Note the low which lingered south and southeast of us for 8 days in April, (Apr. 19-26) and the snow storms with severe cold in the Mediterranean cities during the past winter).

TEMPERATURE CHANGES; COLD WAVES.

The cold waves following in the rear of cyclones are responsible for the rapid falls of temperature experienced by the northern and eastern parts of the United States. The extent or amplitude of these changes depends chiefly upon the descent of the minimum temperatures. The daily changes are least on the Pacific coast, and greatest in the region of the upper Missouri. The midwinter daily changes average 2 to 2.5 degrees on the windward or Pacific coast; 6 in Florida; 8 over this region of the lakes; and 9 to 10.5 degrees in Dakota and Montana.

The frequency and extent of the rapid falls of temperature are greater over the upper great lakes. Falls amounting to 20 degrees in 24 hours are twice as frequent over the upper lakes as they are here, and are four times as frequent here as they are over Florida.

"The temperature changes here are remarkably small for a continental climate, perhaps as small as for any place in the world so far from the ocean. January and February are our worst months. During last January (1901) the average daily range from highest day to lowest night temperature was only 14 degrees, and the average change of the daily mean temperature from day to day was only 6 degrees. During February the similar range was less than 11 degrees and the daily change only 4 degrees. This is remarkable steadiness. Only twice in thirty years has the daily range been as much as 50 degrees, and both of these were rises. Once there was a range of 49 degrees, falling. The figures for other places in comparison are not quickly available, but it is known that the changes are generally much greater. At Boston, for example, the temperature was once 70 degrees above zero at 10 A. M. and 4 degrees below at midnight of the same day. This gives a range of 74 degrees in 14 hours. For really changeable weather we may cite White River, Ont., about twenty miles northeast of Lake Superior, where the following series of daily changes are recorded: —36 in A. M., +30 in P. M.; —42 the next A. M., +28 in P. M.; —28 the next A. M., and +16 in the P. M. Many places along the northern border of our own country experience 'weather' of the same character. On our east coast great changes occur suddenly because the ocean is warm and the

land is cold in winter, and a change in the wind, which may come in a twinkling, changes domination from one area to the other.

"The records of the minimum thermometer for December of many years will probably be representative of Rochester weather, and will show with what moderation we are favored. The temperature changes in cycles, averaging 4.2 days in length. It falls slowly 2.4 days, then rises rapidly 1.8 days. The fall for each day averages 5.6 degrees, and the rise 6.7 degrees. The greatest fall in one spell was 41 degrees in five days in 1884, and the greatest rise was 50 degrees in one day in 1875. This shows a climate not of abrupt changes but one remarkably equable.

"That the temperature at Rochester is continually on the weave up and down is undeniable, but the ups and downs are, as a rule, almost too small to be dignified by the name of changes. Stationary temperature (that is a range of less than 6 degrees during 24 hours) may be predicted at Rochester all the time and the prognostications will exceed 60 per cent. correct. To find greater steadiness than this one will have to retreat to the ocean waters far from land. Rochester has not in any proper sense of the term remarkably changeable weather, but quite the opposite."*

BAROMETRIC PRESSURE.

Although we are quite unconscious of the varying weight of the atmosphere it is a very important factor in weather conditions, and seriously affects life. The normal pressure at sea level of 15 pounds to the square inch varies within a range of about four inches, or from a pressure of 27.5 inches to 31.5. This change is equal to that which would be experienced in passing from a depth of 1,378 feet below ground to 2,133 feet above, or through a vertical distance of 3,500 feet. A change of two inches of mercury is not infrequent in the passage of the more violent cyclones. The tremendous effects of such changes of pressure may be realized when we find that this difference of two inches of mercury, or a pound to the square inch of surface amounts on a square mile to over 2,000,000 tons.

INFLUENCE OF LAKE ONTARIO.

The positive factors in the temperature element of this region are in summer the warm waves and in winter the cold waves. Neither of them ever touch Rochester with great severity. The cold waves are due to the indraught of cold air from the northern regions by the cyclonic movements. The exemption of Rochester from the extreme low temperatures is due to the protection of Lake Ontario. In this respect the city stands quite alone, for while other cities feel some of

*This quotation is from a letter to the writer by Mr. Orin Parker.

the benign effects of the great lakes, none receive so much benefit. The explanation for this partiality is the peculiar situation of the city with reference to the lakes in connection with the direction of the cold waves. Lake Ontario lies directly in the way of the cold anticyclonic waves that pass over this place. It is impossible for the cold waves to sweep across the lake, during the time when the coldest waves occur, without having the lower air warmed by the surface waters. The greatest severity of the cold can not strike the city, although it may be felt on the higher ground farther south.

To appreciate this warming effect of the lake one should realize the heat-storing capacity. Mr. Orin Parker has made an estimate as follows : The mass of water is taken as 650 cubic miles. The cooling of this mass through only five degrees of temperature would eliminate as much heat as the combustion of 2,500,000,000 tons of coal. This is five times the total quantity mined in a year in the whole world. If these figures are not precise they at least give some idea of the magnitude of the forces which are at work. We have the sun heat stored during summer and returned to us when most needed, for the cold waves are moderated by the lake heat until late winter or spring when the severest waves are past.

No other city has lake protection to the same degree. Lake Erie is too shallow to store so large an amount of heat, or Cleveland might have some similar protection, but Cleveland is also exposed to the cold waves which sweep down the Mississippi valley. Buffalo is reached by the cold waves through the space between Erie and Ontario. Oswego is so far east that the cold waves reach it around the east end of the lake. Indeed the lowest temperatures at Rochester have been due to the cold waves passing east of the lake and then backing up on us. Syracuse is too far south and east. Lake Michigan lies nearly on a meridian and its shores are therefore exposed, while Huron and Superior, lying so far north, do not absorb so much summer heat. Rochester has the beneficial effect of the three upper lakes and in addition the fullest protection of Lake Ontario. Certainly no other city in America has a location so peculiarly fortunate in respect to lake protection.

WEATHER PREDICTIONS.

The only prognostication of the weather (not climate) which has any basis in knowledge, or any reliability, is that based on the obser-

vation of approaching cyclones. At the farthest this can be for only two or three days ahead. With some approach to precision the weather may be anticipated for 48 hours. The Weather Bureau makes predictions for 36 hours.

In reading the weather predictions it should be kept in mind that they are of necessity made to cover considerable territory. Within the broad area minor changes, especially of precipitation, may occur. In judging the success of the weather predictions most people take note of the misses but neglect the hits.

Attempts to predict daily weather for weeks ahead has no scientific basis whatever, it is pure guesswork.

CLIMATIC CHANGES.

The ideas of people, especially elderly persons, that the winters are not so cold, or the snows not so heavy as when they were young, is wholly a mistake. The difference is with the experience or condition of the individual.

The records of the weather taken in some countries for centuries, and in this country for about a century do not indicate any certain change in climate. There are secular variations, in which a few years may vary slightly from the normal, but no permanent changes which the observations can yet prove. That slow changes do occur is likely, but they are so gradual that it will take centuries, perhaps, to determine them.

COMPLAINTS OF THE WEATHER.

Personal impressions regarding the weather and climate are not reliable basis of judgment. The individual overemphasizes particular occurrences or exceptional phases and the personal equation is a large factor. Comparatively few people who pronouce judgment on local climate have sufficient experience with far-separated localities to make a fair decision. The truth is given by the statistical records of the climatic factors covering long periods, and not by personal recollections and opinions.

The last two Weather Observers stationed at Rochester, men of wide experience in professional study of climate and weather in several other climatic provinces, and the most competent men to pass judgment on the question, agree that Rochester's climate is ideal for the latitude, and remarkably good ; that taking all elements into consideration it is the finest inland climate in America.

If Rochester has so choice a climate why do so many people speak ill of it? One does not often hear a Californian say ungenerous things of his climate, which, if the truth be told, has some undesirable features. One answer might be that the Californian is whistling to keep up his courage, and that the Rochester climate is good enough to endure abuse. Another answer is that Rochester may have a beautiful climate but that its weather is sometimes pretty bad. Still another reply is that the somber winter skies make people depressed, and that it has become the habit to grumble at the weather. There is a psychological problem involved here.

There is another suggestion, that we have become so accustomed to frequent weather changes that we soon weary of a few days of steady weather of any kind. But this, also, is psychology and not meteorology.

The death of Warner W. Gilbert was announced and the following brief memoir was presented by MISS FLORENCE BECKWITH:

MEMOIR OF WARNER WHITE GILBERT.

Warner White Gilbert was born in Rochester, N. Y., November 29, 1869, and this city was always his home. In 1887 he entered the Rochester Free Academy and graduated in 1891, entering Cornell University the same year and graduating with honor in the Civil Engineering Course in 1895.

Entering immediately upon engineering work, he was employed in a professional capacity upon various local improvements in Rochester, in all positions winning high praise for his proficiency. In 1899 he took the civil service examination and was permanently appointed upon the United States Geological Survey as assistant topographer, which position he held until his sudden death in the Adirondacks on May 19, 1901. While upon the Survey, his work took him to different parts of the country, particularly to the Adirondack and Catskill mountains. On the United States Survey sheet of Niagara River and vicinity his name appears as one of the topographers.

The deceased became a member of the Rochester Academy of Science on August 8, 1881, and from that date continued either as an active or a corresponding member up to the time of his death. He was also a member of the Engineering Society of Rochester, and the Rochester Alumni Association of Cornell University.

When a young boy his health was delicate, and upon the advice of the family physician he was taken out of school and, as much as possible, kept in the open air by interesting him in the study of entomology. Though this course delayed his strictly scholastic education several years, the wisdom of it was apparent in many ways. He became strong and athletic, an ardent lover of nature and fond of out-door pursuits. He not only learned the names and the ways of insects, but of the birds and flowers as well. He explored the woods for miles around Rochester, and knew where the rarest plants grew. His interest in botany continued all through his life, and as his work often took him into wild parts of the country, he frequently sent specimens of rare plants to the Botanical Section of the Academy. He was a close observer and was quick to see differences from the normal type in plants. At one time he found in Pennsylvania a specimen of our native Columbine, *Aquilegia Canadensis*, which was wholly of a pale cream color, instead of red and yellow. He sent the plant home, where it lived and flourished, retaining its peculiar characteristics, and blossoms from it adorned his burial casket.

Endowed with fine mental attributes and a generous heart, with high ideals and lofty aspirations, standing upon the threshold of life with every prospect of usefulness and success, his death was truly a loss to the Academy of Science and to his native city.

JUNE 11, 1901.

The meeting was held at the Mechanics Institute; PRESIDENT FAIRCHILD in the chair; sixty-four persons present.

MISS EDITH M. BRACE, of the Rochester Free Academy, read a paper entitled:

MICROSCOPIC FORMS OF LIFE,

illustrated by the projection microscope.

A paper written by COMMANDER FRANKLIN HANFORD, U. S. N., on the

ISLAND OF GUAM

was read by MISS BECKWITH. The paper gave an interesting description of Guam, its fauna, flora, inhabitants, dress, customs, etc.

OCTOBER 8, 1901.

The meeting was held at the Mechanics Institute; the Treasurer, MR. J. E. PUTNAM in the chair; thirty-five persons present.

MR. J. E. WOODLAND and O. A. GAGE were elected active members of the Society.

MR. J. E. PUTNAM gave a talk upon the

ELECTRIC WELDING OF THE STREET RAILWAY TRACKS IN ROCHESTER,

illustrated by lantern views and experiments.

NOVEMBER 26, 1901.

The meeting was held at the Mechanics Institute; PRESIDENT FAIRCHILD in the chair; seventy-six persons present.

DR. L. A. WEIGEL gave a paper entitled:

PRESENT STATUS OF THE ROENTGEN RAY IN MEDICINE AND SURGERY.

Dr. Weigel also exhibited his apparatus for the stereoscopic study of radiographic plates.

DECEMBER 10, 1901.

The meeting was held at the Mechanics Institute; PRESIDENT FAIRCHILD in the chair; thirty-one persons present.

MR. WALTER F. WEBB was elected an active member of the Society.

PROFESSOR CHARLES WRIGHT DODGE read a biographical paper on the life and work of

VIRCHOW.

The paper was discussed by Dr. Sumner.

MISS JOSEPHINE SHATZ gave a talk upon

IMPRESSIONS OF STUDENT LIFE IN BERLIN.

JANUARY 14, 1902.

ANNUAL MEETING.

The meeting was held at the Mechanics Institute; PRESIDENT FAIRCHILD in the chair; eighteen persons present.

Reports of officers for the year 1901 were read, but no record preserved by the Secretary.

REPORT OF THE BOTANICAL SECTION.

The report of the Botanical Section was read by the Recorder, MRS. J. H. MCGUIRE.

The officers of the Section are: MISS FLORENCE BECKWITH, Chairman; MR. WILLIAM STREETER, Vice-Chairman; MRS. J. H. MCGUIRE, Recorder.

Twenty-three meetings were held during the year at the residence of Mr. William Streeter.

Snowdrops were reported in blossom March 20.

The attention of DR. CHARLES H. SARGENT being called to the fact that there appeared to be a number of *Crataegus* in and around Rochester which did not agree with published descriptions, he requested the members of the Section to obtain specimens of that family and said that he would examine and identify them. As a result a large number of specimens were obtained, most of which are not yet named.*

The following new plants were reported during the year:

Stellaria uliginosa Murr.; *Crataegus pediculata* Sargent; *C. durobrivensis* Sarg.; *C. ellwangeriana* Sarg.; *C. dunbari* Sarg.; *C. laneyi* Sarg.; *C. baxteri* Sarg.; *C. gemmosa* Sarg.; and other *Crataegus* to the number of thirty-five.

New stations were reported for the following rare or infrequent plants:

Menyanthes trifoliata L.; *Hesperis matronalis* L.; *Equisetum limosum* L.; *Arabis perfoliata* Lam.; *Verartum viride* Ait.; *Ophioglossum vulgatum* L.; *Spergularia arvensis* L.

The study of Lichens and Fungi was continued through the year and many species were examined and identified.

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* Subsequently named and published in the brochure "Crataegus in Rochester, New York." Proc. Roch. Acad. Sci., Vol. 4, pp. 93-136, June, 1903.

The following officers of the Academy were unanimously elected for the year 1902:

President—CHARLES WRIGHT DODGE.
First Vice-President—CHARLES R. SUMNER.
Second Vice-President—GEORGE W. GOLER.
Secretary—MONTGOMERY E. LEARY.
Corresponding Secretary—WILLIAM D. MERRELL.
Treasurer—JOSEPH E. PUTNAM.
Librarian—WILLIAM D. MERRELL.
Councillors—HERMAN LEROY FAIRCHILD, till 1905.
JOHN M. DAVISON, till 1905.
GEORGE H. CHADWICK, till 1904.

The paper of the evening was an address by the retiring president, entitled

HISTORY AND WORK OF THE ROCHESTER ACADEMY OF SCIENCE.

BY HERMAN LE ROY FAIRCHILD.

(Address of the retiring President, January 14, 1902.)

CONTENTS.

INTRODUCTION.

For twenty-three years this Society has quietly carried on its work in Rochester, so quietly and unostentatiously indeed that many

citizens do not know of its existence and more do not know or care anything about its life and work. This is not mentioned in criticism or regret, but rather in praise. The study of nature, the search for truth and beauty in the world, is not quite consonant with the pride of publicity and notoriety. The Society has lived like the true student, quietly, modestly, perseveringly, asking no favors and keeping its self-respect as a devotee of the higher thought. May the Society in the future keep this modest scientific spirit of the past.

RETROSPECT—HISTORICAL.

The history of the Society under its present name dates from the year 1881, but including the parent society, from 1879. This history is divisible into three stages. First, that of the Rochester Microscopical Society, from 1879 to 1881; second, that of the early Academy, from 1881 to 1889; and third, that of the reorganized Academy, from 1889 to the present time. These three periods will, for convenience, be described separately.

The Microscopical Society.

The records of the Microscopical Society have been lost. From the recollections of the members the following data have been gathered:

The first suggestion of the formation of the Society was made by Dr. Charles E. Rider. The first meeting, as a conference, was held in Professor S. A. Lattimore's lecture room in chemistry, the southeast room on the first floor of Anderson Hall. The first meeting of organization was held in Dr. Rider's office, 75 S. Fitzhugh St., January 13, 1879. Most if not all of the subsequent meetings were held in the Free Academy. The first president was Professor Lattimore, and the second was Mr. James H. Fisher. The Secretary was Dr. J. Edward Line. Some of the early workers were Edward Bausch, E. E. Bausch, Porter Farley, Frank French, Ernst Gundlach, M. L. Mallory, Robert Mathews, H. H. Turner, William Streeter, J. Eugene Whitney, H. F. Atwood, William M. Rebasz. The Society in 1881 was the largest organization of the kind in America.

The work of the early Society was largely a study and use of the microscope and its accessories. It was a society on the microscope. The firm of Bausch & Lomb had already begun the manufacture of microscopes and Ernst Gundlach had brought to the city his skill as

an optical expert. The interest in applied optics which has made this city famous was already started and the work of the Microscopical Society and its successor, the Microscopical Section of the Academy, has certainly helped in making this the great center in manufacture of optical goods.

The annual, public exhibitions or Soirees given by the Society were occasions of great popular interest. They were continued by the Academy, and will be mentioned later in this writing.

The Early Academy of Science.

Plan of Organization. Sections.

The Rochester Academy of Science was a natural outgrowth of the Rochester Microscopical Society. It was quite inevitable that the interests of the earnest workers should widen out from objects microscopic to things megascopic. It appears that there was an intention from the first of forming the broader society. The introduction to the catalogue of exhibits in a neat booklet published on the occasion of the "Third Annual Reception" at the Free Academy Hall, June 20, 1881, contains this sentence, "The question of organizing an Academy of Science was considered; (at time of organizing the Microscopical Society) but it was deemed best to begin with that department in which the most interest was then manifested, viz: microscopy, and afterwards extend the scope of the society, if desired."

The change of organization was made March 14, 1881, and the Academy was incorporated May 14, 1881. The names of the incorporators were Myron Adams, H. F. Atwood, Charles E. Rider, H. C. Maine, Adelbert Cronise, S. A. Lattimore, William Streeter, Cyrus F. Paine. The seal, familiar to the members of the Academy, was designed by William M. Rebasz, and adopted Nov. 10, 1884.

By the generosity of Mortimer F. Reynolds, and later by the Trustees of the Reynolds Library, the Academy was provided, rental free, with an assembly room in Reynolds' Arcade which remained the home of the Society until the reorganization of the Society in 1889. The room was furnished by the Academy through a subscription fund. About 1886 or 1887, the Microscopical Section leased and furnished a room in the Durand building for its own work.

The early Academy was planned on broad lines and was intended to cover a wide field of study. Sections were organized in several

branches of science, and in some subjects not scientific. In 1886, under the presidency of Mr. Cronise a bulletin board was placed in Reynolds' Arcade by the stairway leading up to the Academy rooms on which was displayed names and days of meeting of the following sections : * Botany, Literature, Entomology, Art, Astronomy, Photography, Microscopy, Anatomy, Hygiene.

Earlier than 1885 there seem to have been sections on Adulterations, Conchology and Taxidermy, judging from the catalogues of exhibits at the Soirees of 1881 and 1884. Other Sections were authorized which do not appear to have become effective.

The Section of Photography was authorized April 12, 1886. A Section of Electricity was authorized November 8, 1886, which seems to have lasted about one year. In 1886, the Literary Section had been merged into a Chautauqua Circle, which had nine divisions and 300 members, and evidently was not under the Academy. In 1888 mention was made of Sections in Art, Botany, Microscopy, and Photography.

Following were some of the more active workers in the Sections : In Microscopy, J. Edw. Line, A. B. Leckenby, M. L. Mallory, Geo. W. Rafter, W. M. Rebasz, William Streeter. In Astronomy, H. C. Maine, N. M. Mann, W. M. Rebasz, William Streeter. In Entomology, Jas. W. Allis, Robert Bunker, H. Roy Gilbert. Photography was a large section with many workers. The sections of Anatomy and Hygiene were naturally the field of the physicians.

Officers of the early Academy.

The Presidents of the early Academy were as follows :

Rev. Myron Adams, 1881-1882.

Mr. H. F. Atwood, 1883-1884.

Mr. Adelbert Cronise, 1885-1886.

Rev. N. M. Mann, 1887.

Mr. S. A. Ellis, 1888.

The following were the Secretaries : H. C. Maine, 1881 ; J. Edw. Line, 1884 ; H. H. Turner, 1885-1886 ; H. T. Braman, 1887-1888.

The Treasurers were Charles E. Rider, 1881; Porter Farley, 1882; J. Eugene Whitney, 1884-1886 ; E. Ocumpaugh, Jr., 1887-1888.

* The Academy is indebted to Mr. Cronise for the preservation of this relic of the earlier days. It is now deposited with the Library.

Purpose and Function.

The object of the Society was set forth in the first clause of the old constitution as follows: "* * * to promote scientific study and research, and especially a thorough knowledge of the natural history of that part of the State of New York in the vicinity of Rochester, and to make permanent collections of objects illustrative of the different branches of science."

The last clause suggests that the founders had in mind general scientific collections and the idea of making a general museum.

Both the Microscopical Society and the early Academy came into public notice particularly through their annual exhibitions or Soirees, which were exceedingly popular occasions. From 2,500 to 3,000 tickets were sometimes issued, and there was demand for more. The admission was free. Those held under the Microscopical Society were in Free Academy Hall, but later they were held in different halls. In August, 1884, the American Society of Microscopists held its annual meeting in Rochester and the Soiree was a united exhibition of that society and the local society, held in the State Arsenal.

While these soirees were general exhibitions by the several sections, the microscopical display naturally predominated. The handsome catalogues printed for the occasions indicate much activity and enthusiasm. Those were the days of enthusiasm, when every member had his microscope.

Dates and Places of Soirees or Receptions.

1879, —— ——
1880, —— ——
1881, June 20, in Free Academy Hall.
1882, —— ——, apparently in the City Hall.
1883, —— ——, in Free Academy Hall.
1884, Aug. 21, in New York State Arsenal, with the Amer. Soc. of Micros.
1885, none held.
1886, —— ——
1887, Dec. 6, in Washington Rink.
1888, none held.

Methods of Work. Results.

It appears that the plan of work of the Academy during those earlier years was to considerable extent that of a school, and one not wholly limited to science. The sections were probably more in the nature of classes, led by the more experienced workers. This was a natural condition where the experts were too few to make a working section, and there were others who desired to learn. The instructional work of the sections doubtless met a want of the time which neither the college nor other institution in the city fully satisfied. As far as they went the results must have been good, as they cultivated an interest in nature and helped to develop latent talent. Probably there are persons who have achieved something in science or have found great pleasure and benefit in scientific study who owe their start to the meetings of the sections. All honor to the enthusiastic workers of those days who gave their time and labor without other recompense than the satisfaction of helping others to an appreciation of nature!

But without some endowment to at least partially pay the instructors this kind of section work was sure to terminate. When the enthusiasm waned and the section work became more of a duty and less of a pleasure, the attendance dwindled and the section became inactive. The number of persons professionally or actively engaged in scientific work was not sufficient to keep several sections alive, and of all the sections formed during the whole history of the Society only one has survived, the Botanical Section. The chief defects of the early organization were the low dues (one dollar, later two dollars) and the lack of concentration. The energy of the few workers was not directed sufficiently upon the general meetings. In 1888, the Academy was so weak and inactive that a committee was appointed to adjust its affairs.

At this juncture the writer, having just settled in Rochester, was called into the consultation and he advised a reorganization of the Academy instead of a dissolution. Acting upon the suggestion a new set of rules was framed and promptly adopted and the present Society began its successful work. The story of the reorganization is on record in the first pages of the first volume of the Proceedings.

The Present Academy.

Ideas and Plan of Reorganization.

The dominant ideas in the new rules were as follows :

(1) The Society to be conducted primarily in the interest of the scientific members ; not as a school of science but more as a scientific club.

(2) The control of the Society to be kept in the hands of those having a permanent or professional interest in science. To secure this the class "Fellows" was created, which must include most of the officers.

(3) Concentration of interest upon the general meetings of the Society. These to be more frequent, at least twice each month, instead of monthly as in the earlier plan.

(4) Sections to be formed only as demanded, and their meetings to be restricted to the members of the Society ; not open to the public.

(5) The business of the administration to be left for details in the hands of an executive committee, called the Council.

(6) The "Collections" to be restricted to the local natural history.

(7) The income to be increased by higher charges.

(8) Publication of the proceedings of the meetings. This last item was regarded by the writer as the most important change. Without publication a scientific society is likely to accomplish little. Its work is liable to be aimless, the results ephemeral and invisible, and its existence unknown outside the town. A publication is an object of proper pride, a source of strength within the society and of respect from without.

The function of a local society, as ours, is somewhat different from that of a national society or of one not including so-called "natural history." The local society has the advantage of a special field or limited territory, which gives definiteness of purpose and opportunity for home research of most fascinating character to many workers. It has also the advantage that the objects of the society and the subjects of study are under the cognizance of the members while the results belong to them immediately.

Having thus briefly outlined the plan of organization and the proper function of our Society, let us see how well the Society has fulfilled its purpose and what results it has accomplished.

MYRON ADAMS.
1881-1882.

H. F. ATWOOD.
1883-1884.

J. H. FISHER.
1880.

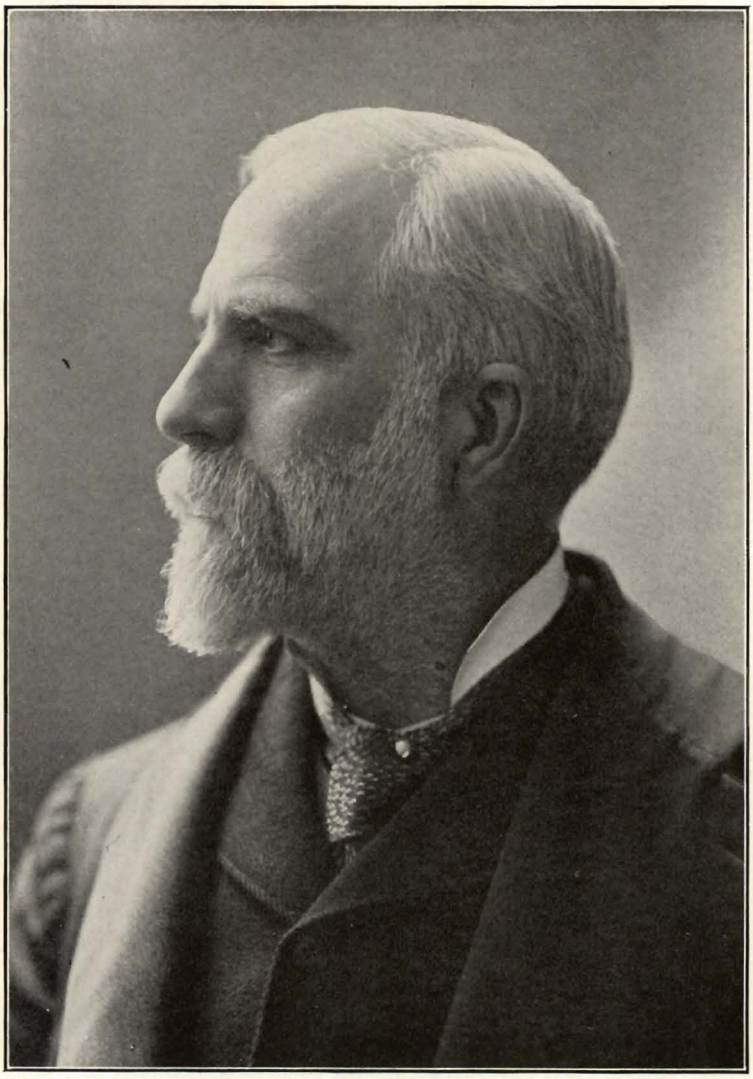
S. A. LATTIMORE.
1879.

N. M. MANN.
1887.

ADELBERT CRONISE.
1885-1886.

S. A. ELLIS.
1888.

PRESIDENTS OF THE SOCIETY
1879-1888.



HERMAN LEROY FAIRCHILD.

President of the Society, 1889-1901.

Work of the Academy. Results Accomplished.

The effects of the Society's activity are not wholly visible, as in meetings, publications and collections. In the pleasure to the members and visitors, in the intellectual stimulus to the community, in the aid and direction given to young students, and in other ways there has been an influence unmeasurable but very effective. The visible and measurable results of the Academy's work are certainly great and we will enumerate some of them with satisfaction.

Meetings.—During the thirteen years since the reorganization of the Academy we have held on the average sixteen meetings a year, or in all about 200 meetings. These have always been free to the public. The attendance has varied greatly, but rarely has there been a meeting with less than twenty-five persons, while the more popular papers and lectures have drawn audiences of 100 to 200 people. The average attendance as shown by the Secretary's reports has been about fifty. This is a better attendance record than can be shown by many societies of much greater resources in the larger cities. This record of meetings and attendance gives an idea of the public side of the Academy's work, its free gift to the community. But the investigational or research work by a society's membership can not be measured by the standard of attendance. A half dozen men, perhaps with their feet on a table, around which they discuss each other's work and exchange new ideas, may alone constitute a very effective society for the higher or productive work.

Papers Presented.—The proceedings of the last thirteen years contain the titles of 226 communications to the Academy. This large number includes many brief papers which occupied only part of a meeting, as well as the many popular and illustrated lectures. The following table will show the distribution of the papers among the many branches of science, and also the numbers published and unpublished. (Since April, 1896, only two papers have been published):

Number of Papers presented to the Academy during the years 1889-1901:

Branches of Science.	Published.	Unpublished.	Total.
Agriculture,	—	1	1
Archeology,	3	—	3
Astronomy,	5	—	5
Biology and bacteriology,	6	8	14
Botany,	14	12	26

Branches of Science.	Published	Unpublished.	Total.
Engineering,	6	3	9
Ethnology,	6	2	8
Forestry,	—	1	1
Geography,	12	11	23
Geology,	21	11	32
Mathematics,	5	—	5
Medical (Sanitation and Hygiene),	7	4	11
Meteorology (and Meteorites),	16	5	21
Mineralogy and Petrography,	6	1	7
Paleontology,	5	1	6
Physics (including Electricity),	14	9	23
Physiology,	3	4	7
Sociology,	1	1	2
Zoology,	12	10	22
Total,	142	84	226

Authors of Papers. The following table will show the number of papers or lectures presented by members and guests of the Academy :

	Published.	Unpublished.	Total.
A. L. Arey,	3	—	3
Arthur L. Baker,	5	—	5
Frank C. Baker,	6	—	6
Henry F. Burton,	2	—	2
Irving P. Bishop,	—	2	2
Florence Beckwith,	3	1	4
Adelbert Cronise,	3	2	5
Martin W. Cooke,	4	—	4
J. M. Davison,	2	1	3
Orville A. Derby,	2	—	2
Charles W. Dodge,	7	8	15
George H. Chadwick,	—	2	2
Elon H. Eaton,	—	3	3
E. H. Edson,	1	2	3
Herman L. Fairchild,	18	9	27
Charles E. Fairman,	3	—	3
G. K. Gilbert,	3	—	3
George W. Goler,	2	1	3
E. E. Howell,	3	—	3
George H. Harris,	2	—	2
Emil Kuichling,	2	1	3
Henry E. Lawrence,	2	1	3
J. Y. McClintock,	2	—	2

	Published.	Unpublished.	Total.
Frank D. Phinney,	2	—	2
Joseph E. Putnam,	3	1	4
H. L. Preston,	4	5	9
George W. Rafter,	3	1	4
Anna H. Searing,	2	—	2
Sanderson Smith,	—	2	2
Lewis Swift,	2	—	2
M. A. Veeder,	6	1	7
John Walton,	2	1	3
C. H. Ward,	2	1	3
Henry A. Ward,	3	1	4
F. W. Warner,	4	1	5
A. L. White,	2	—	2
L. A. Weigel,	—	3	3
Henry S. Williams,	2	—	2
64 persons have presented one paper each,	—	—	64
Total,			226

The 64 persons who have presented but one formal paper include many Fellows and Members of the Academy as well as many visitors of national reputation. Among the latter are H. Carrington Bolton, William R. Dudley, B. E. Fernow, David J. Hill, Edward L. Nichols, Charles S. Prosser, J. Stanley-Brown, Heinrich Ries, Warren Upham, W. W. Rowlee, Charles D. Walcott, Lester F. Ward.

Publications. Up to June, 1896, the Academy had published two volumes of the proceedings and 150 pages of volume 3, making altogether 735 pages of print, not including the brochure covers, each of which carried four pages of print. This is certainly a very creditable record for seven years of work, considering the small resources of the Academy in money, derived wholly from the dues of the members. But this printing had been such a strain upon the treasury that, along with the effect of the financial stress in the business world following the panic of 1893, the printing of the Proceedings was suspended for a time. Another brochure of 80 pages, being brochure 2 of Vol. 3, was published in March, 1900. This placed in print the Academy record down to April, 1896. We are six years behind in the printing of our transactions. During the past year, 1901, 66 pages of volume 4 have been published on a new plan, that of printing papers as separate brochures, without the record of administrative business or miscellaneous scientific proceedings, reserving

these for the end of the volume where they will be appended in condensed form.

The scientific matter given to the world in the printed Proceedings of the Academy is classified as follows :

Volume 1, 216 + X pages.
Volume 2, 348 + XI pages.
Volume 3, 230 pages.
Volume 4, 66 pages.

Total, 860 + XXI pages.

	Number of pages.
Archeology,	4.75
Biography,	15.50
Biology,	10.75
Botany,	233.50
Engineering,	9.50
Ethnology,	11.50
Geology,	120.
Mathematics,	18.00
Meteorology and Meteorites,	76.00
Mineralogy and Petrography,	18.50
Paleontology,	4.25
Physics,	10.50
Sanitation and Medical,	10.
Zoology,	144.
Scientific,	686.75
Miscellaneous and Administrative,	115.25
Total,	802.00
Lists and Indexes,	58.
Introductory (Roman pagination),	21.
Published matter,	881.00
Printed pages of covers,	40.

Important papers. Local studies. It will be of interest to name some of the more important papers which have been published in the Proceedings. At the same time this will show what branches of the local natural history have been seriously studied and with what success.

Botany. First in order both in amount and in thoroughness of work is the study and publication of the plant life of the region. The monograph forming the first 150 pages of volume 3 of the Proceedings, entitled "Plants of Monroe County, New York, and Adjacent

Territory," is a splendid and enduring monument to the persistent and excellent work of the Botanical Section and to the editors of the list.

The three papers by Dr. Charles E. Fairman, of Lyndonville, on the Fungi of Orleans county and of Western New York have added to the reputation of the Academy in botanical lines. The same should be said of the paper by Mr. Charles W. Seelye on the local Ferns, and also of the short papers by Miss Florence Beckwith, Professor C. W. Dodge and Dr. Anna H. Searing.

Zoology. The paper on "Birds of Western New York," by Mr. Elon H. Eaton, forming pages 1–64 of volume 4, is a piece of excellent work on the fauna of this region. And as much should be said of the article on "The Mollusca of Monroe County, N. Y.," by Mr. John Walton, which forms pages 3–18 of volume 2, and is illustrated by eight elegant plates of his own drawing.

Ethnology. Two papers by the late George H. Harris are the beginning of what should be a series of papers on the life and customs of the aborigines of this territory.

Meteorology. The interesting paper by Mr. Orrin Parker on the "Climatology of Rochester," proves the fact of peculiar and favorable climatic conditions in this city.

Geology. Considerable work has been done in the study of the geology and physiography of the region, and several papers have been printed. The longest paper is by Professor Charles S. Prosser, giving the section of strata on the Genesee meridian from Lake Ontario south to Pennsylvania. Other papers are by Mr. Albert L. Arey, Mr. Warren Upham and by the writer. Most of the studies of the writer having been described in other journals, as the Academy was financially unable to give them publication.

Our Proceedings have not been confined to papers of local bearing. It is impossible to refer to all the papers of broader reference. Mention should be made of the many descriptions and analyses of new meteorites, by Mr. J. M. Davison, Mr. E. E. Howell, Mr. H. L. Preston and Dr. Henry A. Ward, which have given our publication an eminent place in the literature of meteorites. In this connection may be mentioned the several theoretic papers on meteorology by Dr. M. A. Veeder. The papers by Professor Arthur L. Baker in the new mathematics, with illustrations, are of a high order. Some papers by Mr. Frank C. Baker deal with the mollusca.

Exchanges. Our Proceedings have been donated to several hundred scientific and educational institutions in foreign countries as well as America, and have carried the name and fame of Rochester around the world. The list of "Exchanges" includes at present nearly 200 institutions in the United States and over 300 in foreign countries.

Library. The most valuable piece of property owned by the Academy is its library, now deposited, under suitable contract, in the Library of the University. It has been accumulated almost entirely since 1891 as a result of our system of exchanging publications with other societies the world over. It is composed largely of the proceedings or transactions of scientific societies and museums, which publications are difficult to obtain except by way of exchange, and now includes about 5,000 volumes and pamphlets.

Collections. Something has been done in the way of making collections representative of the local natural history. The Herbarium, especially, can be mentioned with pride. It is another monument to the successful labors of the Botanical Section. Through the gifts of the members, and by donations and exchange it now includes about 15,000 specimens. Among special collections in the herbarium is the collection of ferns, numbering about 1,500 specimens, presented to the Academy by Mr. C. W. Seelye. (See Proceedings, Vol. 2, page 180 ; volume 3, page 195.)

The collection of local molluscan shells presented to the Academy by Mr. John Walton is on deposit in the Zoological Museum of the University. It has recently been rearranged and relabelled by Mr. George H. Chadwick, and is a fine display of a local fauna. The suite of local fossils donated by Mr. A. L. Arey is a partial representation of the ancient life of the region as preserved in the Rochester rocks. It is deposited in the Geological Museum of the University.

The Robert Bunker Collection of insects, handsomely mounted and cased, has been housed for a number of years in the vestibule of Sibley Hall. In 1882 Mr. Robert Bunker transferred the collection to three trustees, Adelbert Cronise, Joseph T. Alling and H. F. Atwood, with the verbal understanding that it should remain in the custody of the Academy under conditions of proper housing and care. The handsome mounting and casing of the collection was made by special contributions of money secured by Mr. Cronise and Major Streeter.

Finances. The expenses of the Academy, for meetings, lectures, notices, postage, printing and distribution of the Proceedings, and for some clerical work, have been borne entirely from the annual dues of the small membership. No donations have been received or asked from the public. While doing a valuable work for the city at large the Academy has never placed itself in the position of an object of charity. It has worked on quietly, economically using the small means at command, not seeking popularity or notoriety, but following the spirit of the seeker after truth for truth's own sake. Donations to our treasury would probably not be refused. But if such come let it be so as to preserve to the Society its present independence and self respect. Much money is not the most valuable possession of a scientific society. Like individuals, those that are so unfortunate as to become rich lose their activity.

One acknowledgment of valuable assistance should be made. Since the reorganization of the Academy, in 1889, as previously, it has paid no rental for places of meeting. For many years the University extended the hospitality of its buildings, and they are still open to us. Later for some years the meetings have been held in the assembly rooms of the Reynolds' Library, through the courteous generosity of the Trustees. For some months we have been accepting the hospitality of the Mechanics Institute. The writer is sure that he expresses the sentiments of all the members of the Academy in here thanking the officials of these three institutions. At the same time we do not forget Talleyrand's famous mot, that gratitude is a lively expectation of favors to come.

Sections. Under the present Academy the sectional work has not been made a prominent part. Sections have been proposed in different branches from time to time, but only three have been organized. A section of Geology was organized Oct. 28, 1889, which continued for about three years. Two annual reports of the Section are printed in the Proceedings, Vol. 1. The Chairman of the Section was E. E. Howell, and the Recorder, H. L. Preston. A Section of Zoology was organized Apr. 14, 1890, with Frank A. Ward Chairman and Geo. W. Rafter Recorder. It held meetings about one year.

The Botanical Section deserves special mention and honor. The section was organized April 13, 1881, at the house of William Streeter, No. 14 Scio Street, which place has been its home since

1889. During the years 1881-1888 the Section met at the Academy rooms in Reynolds Arcade.

During 23 years the Section has steadily carried on its work, with no serious interruption. A band of nature's devotees, they have held aloft the torch of Science while all the other sections have died. What is the reason for the success and vitality of the Section? Partly, possibly to great extent, that the majority of workers have been women. And partly the possession for the last thirteen years of a pleasant meeting place, through the hospitality of Mr. and Mrs. Streeter and the superior advantages by the use of Mr. Streeter's unsurpassed microscopical apparatus and material, and his extensive library. In partial recognition of his services to the Society Mr. Streeter was some time since elected a Life Member.

Officers of the Botanical Section.

Chairman (President to 1889): Geo. T. Fish, 1881; Mrs. William Streeter, 1882-1885; Miss Mary E. Macauley, 1886-1896; Miss Florence Beckwith, 1897 to date.

Recorder (Secretary to 1889): Mrs. William Streeter, 1881; Miss M. E. Macauley, 1882-1883; Miss C. A. Yendes, 1884; Mrs. J. E. Whitney, 1885-1886; Mrs. J. H. McGuire, 1887 to date.

Officers.

Officers of the Academy, 1889-1901.

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First Vice-President: J. Edward Line, 1889; S. A. Ellis, 1890; Albert L. Arey, 1891-1892; John M. Davison, 1893-1898; George W. Goler, 1899-1901.

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Councillors (Dates of election ; period of office three years): Edward Bausch, 1889 ; S. A. Lattimore, 1889 ; Florence Beckwith, 1889, 1891, 1901 ; J. E. Whitney, 1889, 1894 ; M. L. Mallory, 1889; William Streeter, 1889, 1892 ; J. M. Davison, 1890, 1899 ; Cyrus F. Paine, 1890 ; J. L. Roseboom, 1891, 1894, 1897 ; H. L. Preston, 1891, 1893 ; Henry A. Ward, 1892 ; F. W. Warner, 1893 ; Mary E. Macauley, 1894 ; J. Y. McClintock, 1894, 1896 ; C. C. Laney, 1895; G. W. Goler, 1895 ; Adelbert Cronise, 1896 ; Eveline P. Ballentine, 1897, 1900 ; Edwin A. Fisher, 1898 ; H. E. Lawrence, 1898 ; Emil Kuichling, 1899 ; Charles T. Howard, 1900 ; Charles R. Sumner, 1901.

PROSPECT.

Thus far in this writing we have dealt with accomplishment. In regarding the future of the Society we must rest in matters of anticipation, imagination, opinion, a rather unscientific basis. And some persons may not fully agree with the writer's thought. However, he will venture to give the Society the benefit of his experience and a little fatherly advice.

Investigational Work to be Done.

There is an attractive field of work before the Society in the fuller study of local nature. This will be better appreciated by enumerating some of the special subjects.

Botany. The flora of the region will need continuous study. Already additions and changes require a supplement to the published plant list. The cryptogamic plants constitute an almost untouched field in this territory, and students can find here subject for long and delightful study.

Zoology. Many groups of animals should be studied and lists published. The mammals, reptiles, amphibians and fishes of Western New York should each be treated as Mr. Eaton has treated the birds. Among the invertebrates many groups may be mentioned as suitable for study. For example, the pecular insects, the myriapods, the crustaceans, the arachnids, the worms. In the microscopic animal life there is a vast opportunity for specialized study.

Mineralogy. Our local rocks yield a larger number of minerals, and crystallized forms, than is generally known. Some one should make an interesting paper on the subject.

Geology. A large and interesting field opens before us in this department of science. There are many topics for special study : the strata, the rocks, the fossils, the past and present forces and agencies. The physiographic features and processes are specially interesting.

Meteorology. The observation and collection of meteorological data is done by the local weather bureau of the government, but this is not published in generalized form convenient for the public. The cyclonic storms and other atmospheric changes are remarkably interesting phenomena, and the science of meteorology will grow in importance and popularity.

Beyond the local field the Society has the same opportunity and privilege of ranging over the whole universe of mind and matter that any society or individual possesses. Certainly there is no lack of "worlds to conquer" and opportunity to employ all the energy and money that the Academy will own.

Collections.

As the Academy has no home or permanent place of its own for housing of collections there is less encouragement to this work. But those collections already owned should be conserved and the making of new ones is advised. Without a building a society often finds its collections or museum a real burden. We are fortunate in being able to deposit our collections at the University, where they are in constant use and safe from fire. Such material can be better cared for by a college or other endowed institution with fire-proof buildings and permanent corps of men professionally engaged in scientific work. The Academy should encourage its members to make local collections, but with the intention of depositing them in the college museums, where they will receive proper care in suitable relationship and environment.

The making of local natural history collections is a proper function of the local scientific society, as is the publication of the results of their study. The care of the collections is a proper function of the local college. The use of the collections should be the privilege of any interested person.

Publication.

Volume 3 of the Proceedings should be immediately completed, ready for binding, and the record of the meetings published to date. The set of Proceedings should be continued steadily with as little change of form as possible. The present form and style have been highly commended by experts. Changes in the form of a serial are very undesirable. It is even better to continue an imperfect form than to change, as is shown by the present serials of some of the old societies. Our form is quite ideal and it would be a great mistake to cheapen it with a view to economy. A few dollars saved in the paper and letterpress would be entirely disproportionate to the loss.

The support of the Proceedings should be the chief aim of the Academy, for publication encourages and requires good work in the scientific lines. By its publication the Society not only gives its members a substantial and gratifying return for their support but is kept in touch with scientific thought and effort over the world. It saves the Society from isolation and atrophy. It is a product visible to all men and a matter of proper pride to every member, and is the peculiarly appropriate work of the Academy.

Finances.

The writer is convinced that a mistake was made in 1891 in cutting off the initiation fee of five dollars. It is a mistaken idea that low charges make a society more attractive or greatly increase its effective membership. Few desirable people join a scientific society simply because the cost is small. Those who join should do so because they are interested in the work and are willing to share in the expense. The society will merit and receive more respect from its members and the public that exacts a yearly due of no small amount. Most people value things by what they cost. When the price of membership is cheapened the regard for the society is lessened, and the financial ability of the society to do its work, which alone entitles it to respect, is also lessened. The reduction cuts in two ways. By dropping the initiation fee the Academy sacrificed a part of its income without any compensating gain. At the reorganization the dues had been raised from one dollar to five and the membership steadily increased.

There are only two classes of persons upon whom the Society can rely for permanent membership. These are, first, those who have a genuine interest in science, and, second, those persons who have some

sympathy and respect for the Society and to whom the money charges are of slight consequence. Low charges repel instead of attracting the latter class of patrons.

The Academy should restore the initiation fee of five dollars, thus requiring a payment of ten dollars to perfect membership. And the cost to women should be made the same as to men, instead of two dollars, as at present. Why should not the women practice their theory of equality? A scientific society should be thoroughly democratic and show no favors.

A glance at the minutes of the Academy show that for several years a large proportion, or a majority, of the persons who have been elected to membership have never qualified. This is a bad state of affairs. It means either that the persons were proposed without proper assurance of their interest, or that the administrative officers have not properly looked after the elected persons.

Administration.

One helpful change will be to throw more of the details of administration upon the Council. The rules should be so amended as to empower the Council to elect members (not Fellows) and to direct the payment of ordinary expenses. This would relieve the Academy meetings of some annoying business details. The practice in successful scientific societies is to concentrate in the Council the responsibility of the business administration.

But the one absolute essential to successful administration is devoted, tactful officers. One man alone can make a society grandly successful if he is the right man in charge of the machinery. But he must not only possess certain mental qualities, he must have the work and welfare of the society on his mind and heart, so that he eats and sleeps with it and never counts the cost to himself in time and labor.

The writer's suggestion is to go slow. Better be too conservative and keep in well-worn paths rather than too radical. Never make changes merely as experiments. Do not become discouraged because the Academy is small or weak and some great thing can not be done at once. A few choice scientific minds with a very little money will, with patience, persistence, courage and wise economy produce scientific results that will make the Society honored at home and abroad.

The function of the Academy as a center of scientific influence is

perpetual. New generations of men and women will need its help. Its work in the investigation and publication of the natural history of Western New York may sometime be completed in the main, but now that work is only begun. The future calls. Let us see that as men and women interested in truth and beauty of nature we make this Society, our society, fulfill the sentiment of its motto on the Seal, capio lumen.

A unanimous vote of thanks was tendered the retiring President for the great interest he had shown in the welfare of the Academy and for his untiring labors for the Society during the fourteen years that he had occupied the presidential chair.

Index, Volume III.

Note :—Only the scattering references to plants are given in the following index. Names of the local plants will be found in the index to the Monroe County Flora, page 147, and in the several reports of the Botanical Section, pages 157, 185, 193, 245, 248, 253, 258, 262, 271, 285, 295, 319.

Cryptogams of Orleans County are named in the paper by Dr. C. E. Fairman, page 207.

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