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TABLE OF CONTENTS.

VOLUME III.

BUSINESS PROCEEDINGS.

SCIENTIFIC PROCEEDINGS.

ILLUSTRATIONS.

PROCEEDINGS

OF THE

ROCHESTER ACADEMY OF SCIENCE

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PROCEEDINGS
OF THE
ROCHESTER ACADEMY OF SCIENCE.
VOLUME 3.

OCTOBER 8, 1894.

STATED MEETING.

The President, PROFESSOR H. L. FAIRCHILD, in the chair.

Thirty-five persons present.

The Council report recommended:

(1.) The payment of bills for printing the Proceedings and for miscellaneous expenses.

(2.) The election of MR. ADELBERT CRONISE as Councillor in place of MR. J. EUGENE WHITNEY, who had been made Vice-President.

The bills were ordered paid and MR. CRONISE duly elected Councillor.

The Corresponding Secretary made a verbal report upon the distribution of the Proceedings, Brochure 3, Volume 2.

An abstract of the following paper was read:

PLANTS OF MONROE COUNTY, NEW YORK, AND ADJACENT TERRITORY.

BY FLORENCE BECKWITH AND MARY E. MACAULEY,
ASSISTED BY JOSEPH B. FULLER,
Under authority of the Section of Botany.

CONTENTS:

INCEPTION OF THE WORK; AUTHORSHIP.

The Botanical Section of the Rochester Academy of Science has for many years entertained the plan of eventually publishing the flora of this region, and the members of the Section have individually and collectively labored earnestly toward that end. About four years ago the Section appointed a Committee, consisting of the Chairman and Vice-Chairman, to compile and prepare for publication the flora of Monroe county and adjacent territory. The Committee have collated all the lists of plants of this vicinity which they have been able to obtain, have examined the specimens in the herbarium of the Academy, and have used all available sources of information.

Scope of the List.

The list aims to include the names of plants which grow without cultivation in Monroe and adjoining counties. While it is believed to be nearly complete as regards Monroe county, it is not claimed to be so for the adjacent counties.

The list includes phanerogams and vascular acrogens. Much care has been exercised in the determination of specimens, and all those concerning which there have been reasonable doubts have been excluded.

Territory Included.

The territory included, as seen by the accompanying map, comprises the whole of Monroe county and parts of Genesee, Livingston, Orleans, Ontario and Wayne counties. The area in general is the lower drainage basin of the Genesee river, with that of Irondequoit creek and smaller streams upon the lake border.

The Map.

The map, Plate 1, was drawn expressly to accompany this list, and is designed to be a guide to all parts of the region, locating as it does the roads and streams, and points of especial botanical interest. In lack of any definite geographic boundaries, the outlines of the map were fixed somewhat arbitrarily.

Authorities and Collectors.

Early Botanists of the Region.

The work and records of some of the early botanists have been of great assistance to us. Among these botanists Dr. Chester Dewey, whose work in Rochester extended from 1836 to 1867, is the most eminent. His great work on the *Carices* had been commenced in 1824, and he brought to Rochester an established reputation as a botanist. "Botany was a favored subject in the school curriculum, and it was seldom that a class was lacking to receive his instruction. Up to the year 1850 farming lands and the virgin forests occupied a large portion of the present area of the City of Rochester, and therefore the meadows and fields, woodlands and by-ways, were easy of access, and the native plants were gathered by many eager collectors. In this way Dr. Dewey examined and re-examined many times the greater portion of the flora of this region, while at the same time he was training up the youth to share his interest in botanical pursuits. The influence which he thus exerted is still perceived by some of the

members of the Academy of Science, and it has passed out and onward over a great region, so that a large number of the younger botanists of the present time owe indirectly to Dr. Dewey the interest which they now possess for botanical studies."*

He was the author of a paper entitled "Catalogue of Plants and Time of Flowering in and about the City of Rochester, for the year 1841," published in the Fifty-fifth Annual Report of the Regents of the University of the State of New York, but unfortunately he did not publish a complete record of his work in this region.

From 1825 to 1880 Dr. Samuel B. Bradley† did very thorough work along the lake shore and the inlets and ponds adjoining. Some of the plants which he reported have since become extinct, or, at least, have not been found by later botanists.

The Rev. Lawrence Holzer was Rector of St. Joseph's Church, Rochester, from 1862 to 1865. He was an enthusiastic botanist, and collected quantities of specimens which he sent to societies and institutions in Europe. A list of the plants found by him, comprising 766 species, shows that he explored the city and vicinity very thoroughly. This list was kindly lent the Committee by Dr. C. M. Booth.

The late Mr. Otto Betz, whose name frequently appears in the list, was a close and accurate observer, and reported many new localities for plants, particularly in the towns adjoining Rochester on the east.

It seems fitting in this place to mention the late Mrs. Mary E. Streeter, to whose enthusiasm and persistent labors the Botanical Section in a large measure owes its existence. She was an intense lover of nature, and possessed not only unusual powers of observation but also a mind of rare intelligence; her loss is felt to be irreparable. The publication of a list of Monroe county plants was a work which she had planned to do, but failing health put an end to her labors.

RECENT COLLECTORS.

Dr. Charles M. Booth, one of the most indefatigable of our collectors and a particularly pains-taking and accurate botanist, still resides near Rochester. The record of his explorations in Monroe and Genesee counties has been of very great assistance to us. He has made especial study of the *Gramineæ*. At present he is working

*From Biographical Sketch of Dr. Dewey, by C. W. Seelye, read before the Academy of Science June 24, 1895.

†See Biographical Sketch, Proc. Roch. Acad. Science, Vol. II. pp. 261–263, 1894.

on the mosses of this region, and it is hoped that the results of his labors upon these interesting plants will be given to the Academy for publication.

MR. JOSEPH B. FULLER, Curator in Botany to the Academy, is doing excellent work on our herbarium, to which he has generously added his own large collection. His extended list of plants, the result of many years' collecting, particularly along the banks of the Genesee river, added largely to our list of species.

MR. CHARLES W. SEELYE, a fine general botanist, has of late confined his attention mostly to ferns. A list, with notes, of those indigenous to the vicinity of Rochester was furnished by him to the Academy in 1891,* which is the basis of our present list.

MR. GEORGE T. FISH, who has collected more around Sodus bay than any other of our local botanists, and who shares the honors of that locality with Mr. Hankenson, kindly lent to the compilers his valuable list, revised from his herbarium.

DR. ANNA H. SEARING has made a special study of the plants growing in the vicinity of Long Pond.† Her list has aided greatly, especially in the *Carices*.

MR. M. S. BAXTER has extended our list by adding several plants never before reported in this region. Among these are *Arceuthobium pusillum* and *Epipactis Helleborine*. He has also given many additional localities for rare plants.

PROFESSOR W. H. LENNON, of the Brockport Normal School, has reported a number of plants not observed by others. To him and Mr. Baxter are due the credit of explorations in the western part of Monroe county, particularly near Adams Basin, and also near Holley, in Orleans county. Many rare plants have been reported by them from these localities.

MISS LUCY WELD, of Lyndonville, has furnished a partial list of the plants of Orleans county.

TO MR. E. L. HANKENSON, of Newark, a Corresponding Member of the Academy, we are indebted not only for his extensive and valuable list of Wayne county plants, but also for generous donations of specimens, representing the flora of other parts of our country, as well as that of our own immediate neighborhood. Where mention is made of Wayne county it will be understood that Mr. Hankenson is the authority, unless otherwise noted.

*Proc. Roch. Acad. Science, Vol. I. pp. 186–197, 1891.

†See Proc. Roch. Acad. Science, Vol. II, pp. 297–300, 1895.

ACKNOWLEDGEMENTS.

The thanks of the compilers are also due to MR. and MRS. WILLIAM STREETER, MR. A. M. DUMOND, MR. C. C. LANEY, MR. JOHN WALTON, MR. JOHN DUNBAR, MR. W. W. PARCE, MRS. J. H. MCGUIRE, MRS. GEO. C. KING, MISS EMMA E. ILES, MRS. E. L. MAGUIRE, and MISS JOSEPHINE HOFFMAN, members of the Botanical Section; their untiring zeal has added the names of many plants to the list. To Mr. Baxter and Mr. Walton we owe the description of Mendon Ponds; to Professor Lennon the description of the ravine at Holley and the swamp at Bergen; and to Mr. Baxter the description of the swamp at Adams Basin.

To PROFESSOR W. W. ROWLEE, of Cornell University, we are especially grateful for his review of the entire proof of the plant list, and for his examination of large numbers of doubtful specimens, particularly the *Cyperaceæ*, with the assistance of MR. K. MCK. WIEGAND upon the *Carices*.

The assistance of MR. J. B. FULLER in preparing this list, and in making the comparisons between the floras, has been invaluable. Without his pains-taking care and untiring labor the list would have been far less complete and accurate.

To the President of the Academy, PROFESSOR H. L. FAIRCHILD, the Committee are indebted not only for the chapter upon the physical characters of the region, but for the help and encouragement which alone have made possible the publication of this list.

LOCALITIES OF SPECIAL INTEREST; THE LESSER FLORAS.

The flora of the territory, as a whole, is not greatly varied, although there are localities of special interest. Among these are the shores of Lake Ontario and Irondequoit bay, the banks of the Genesee river, the Mendon ponds, the swamp at Adams Basin, the large swamp in Genesee county commonly called Bergen swamp, and the ravine at Holley, brief descriptions of which follow.

SHORE OF LAKE ONTARIO.

The shore of Lake Ontario is usually steep bluffs of "boulder clay." In some places the Medina sandstone is exposed, while in many places the new beach has cut off bays which are filling as marshes.

The shore of the lake has been very thoroughly explored by Dr. S. B. Bradley, Dr. C. M. Booth, Dr. Anna M. Searing, Mr. J. B. Fuller, and Mr. George T. Fish.

The following plants are peculiar to the lake shore: *Ranunculus flammula* var. *reptans*, *Cakile Americana*, *Polanisia graveolens*, *Lathyrus maritimus*, *Strophostyles angulosa*, *Potentilla supina*, *P. Anserina*, *Coreopsis discoidea*, *Artemisia caudata*, *Polygonella articulata*, *Euphorbia polygonifolia*, *Juncus Balticus* var. *littoralis*, *Cyperus Schweinitzii*, *Scirpus Smithii*, *Sporobolus cryptandrus*, *Ammophila arundinacea*, *Equisetum variegatum*. *Artemisia Canadensis* occurs along the lake shore and on the bluffs of Irondequoit bay near the lake.

IRONDEQUOIT BAY.

The shores of Irondequoit bay and the slopes of the depression which continues several miles south of the water are high and steep bluffs of clays or sandy silts. Through this deposit the tributary streams have cut deep, narrow gullies. Isolated masses of the deposit, as "sugar loaves" and butte-like mounds, give a very picturesque character to the upper or southern part of the gorge.

The flora of the shores of the bay is not in any degree distinctive, but is remarkable rather for the great variety of species of plants found here, some of which are mentioned as follows. The trees are principally oak and chestnut, with a few pignut hickory, birch, poplar, hemlock, witch hazel, and occasional specimens of white and pitch pine. Desmodiums, Lespedezas and Lupins are plentiful. *Aquilegia Canadensis*, *Baptisia tinctoria*, *Viburnum acerifolium*, *Hieracium venosum*, *H. paniculatum*, *H. scabrum*, *Vaccineum stamineum*, *V. Pennsylvanicum*, *Pyrola rotundifolia*, *P. elliptica*, *Gaultheria procumbens*, *Rhododendron nudiflorum*, *Gerardia flava*, *G. quercifolia*, *G. pedicularia* and *Cypripedium pubescens* are common. *Epigæa repens* was formerly abundant, but is now scarce. *Anemone cylindrica*, *Tephrosia Virginiana*, *Castilleia coccinea*, and *Chamælirium Carolinianum*, though scarce, are more frequently found here than elsewhere. *Arenaria stricta*, *Hibiscus Moscheutos*, *Poterium Canadense*, *Potentilla palustris*, *Salix candida* and *Polygonum Muhlenbergii* are rare. *Campanula rotundifolia* var. *arctica*, *Gentiana puberula*, *Festuca tenella*, and *Cyperus filiculmis* have not been found elsewhere in our district. Of *Pterospora Andromedea* a single specimen has been found.

The extremities of the bay are filled with beds of flags. All the forms of *Typha* are present, *T. latifolia* var. *elongata* being the most plentiful. Extensive beds of *Chara* exist. *Elodea*, *Myriophyllum spicatum* and various species of *Potamogeton* are abundant. *Wolffia*

and *Lemna* cover the stagnant waters in coves and in openings among the flags. *Nymphæa reniformis*, *Utricularia vulgaris* and *Valisneria* are common. *Naias marina* is abundant in some of the coves on the west side. *Sparganium minimum* is found in our district only here.

GENESEE RIVER.

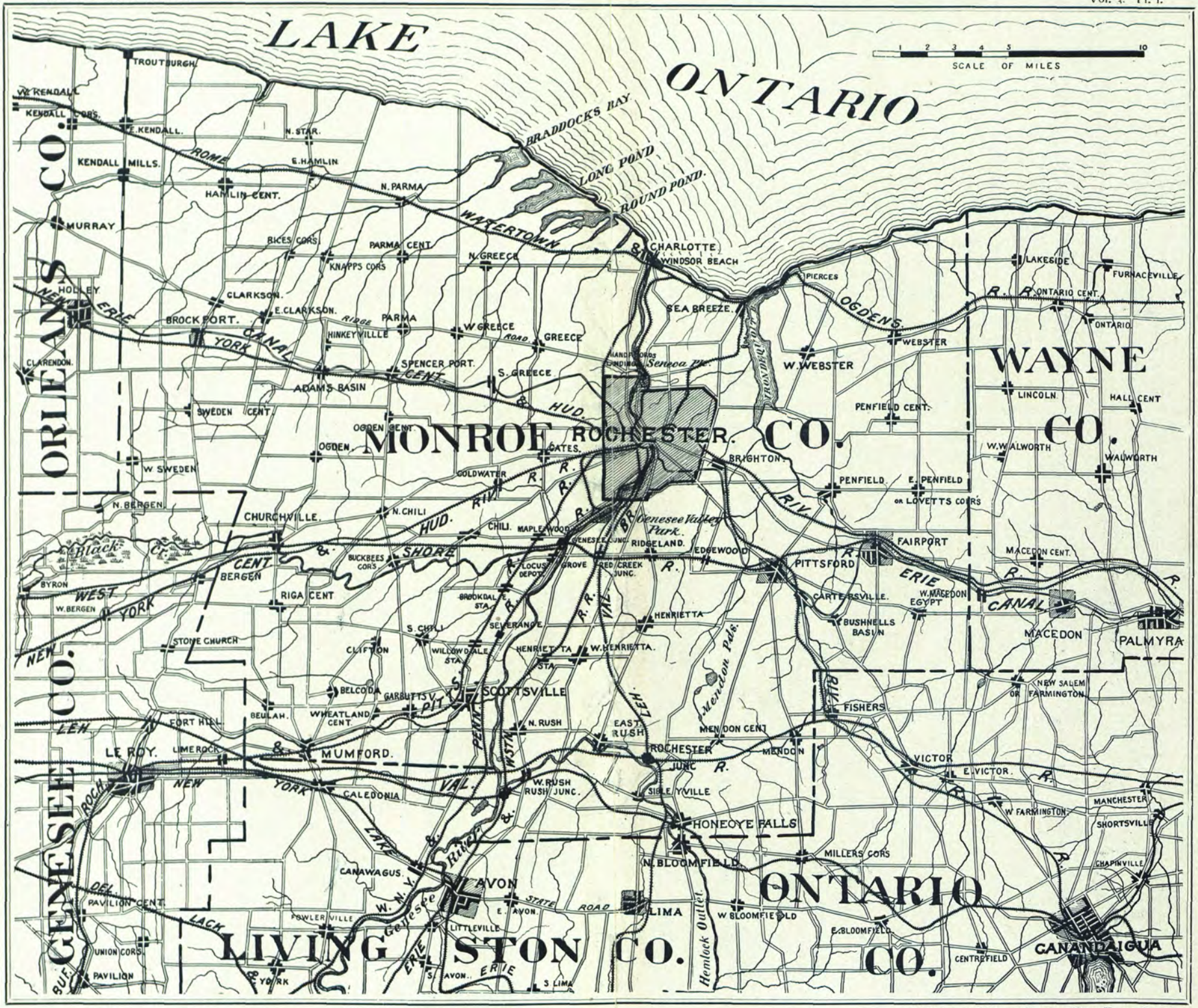
The walls of the ravine of the Genesee river below Rochester are vertical rock-walls of sandstone, shale and limestone, about 200 feet high, with heavy talus on the radial side of the river curves. In the southern part of the city the river flows in a shallow channel in the Niagara limestone. Above the city the river flows in a bed of drift with broad flood-plains.

The river and its banks have been a peculiarly rich field for the botanist, including as they do plants belonging to the aquatic flora as well as those of upland growth. Mr. Joseph B. Fuller, who has probably explored this region more thoroughly than any other collector, excepting Dr. C. M. Booth, reports that in the territory between Vincent Place bridge and Hanford's Landing, a distance of two and a half miles, he has found five hundred species of plants. We doubt if a better record can be shown anywhere for the area covered. The growth of the city has undoubtedly destroyed some of the species, but the most of them can still be found.

MENDON PONDS.

The Mendon ponds lie among a group of sand and gravel knolls* about twelve miles south-east from Rochester. They are five in number, the smallest covering only a few acres, the largest having an area of over one hundred acres. Four are connected by creeks or marshes, and form the head of Irondequoit creek. A fifth is apparently without outlet. Some sphagnum bogs represent other former ponds. The margins of the ponds are generally low and marshy. Sphagnum grows here luxuriantly, forming a bed for large numbers of *Sarracenia*, *Drosera*, *Calopogon*, and many other species. The land adjoining is under cultivation, but some low borders and hillsides are covered with forests which contain nearly every species of tree found within the district. The tupelo is represented by several large, fine trees. Black spruce is reported within the county only at this point. A characteristic feature of this locality is the occurrence of thousands of plants of species which are elsewhere scarce. Acres of marsh are

*See page 35.



yellow with *Potentilla fruticosa*. *Cassandra calyculata* has so overgrown one bog that it cannot be crossed except by treading down the shrub. *Andromeda polifolia*, *Ledum latifolium*, *Vaccinium corymbosum*, *Gaylussacia resinosa*, *Nemopanthes fascicularis*, *Pyrus arbutifolia* var. *melanocarpa*, and *Aralia hispida* are all present in great quantities. *Sarracenia purpurea*, *Drosera rotundifolia*, *Pogonia ophioglossoides*, *Calopogon pulchellus*, *Cypripedium spectabile*, *C. pubescens*, *C. parviflorum* and *C. acaule* are exceedingly abundant; and the same may be said of *Woodwardia Virginica*. *Nymphæa odorata* var. *minor* covers all the borders. Other plants which occur in more or less abundance are: *Viola tricolor* var. *arvensis*, *Parnassia Caroliniana*, *Drosera intermedia* var. *Americana*, *Decodon verticillatus*, *Rhus venenata*, *Viburnum cassinoides*, *Valeriana sylvatica*, *Menyanthes trifoliata*, *Utricularia cornuta*, *U. gibba*, *U. resupinata*, *Corylus Americana*, *Arceuthobium pusillum*, *Salix myrtilloides*, *Corallorhiza odontorhiza*, *Habenaria blephariglottis*, *H. lacera*, *Liparis Læselii*, *Scheuchzeria palustris*, *Dulichium spathaceum*, *Rhynchospora alba*, *Scleria verticillata*, *Asplenium ebeneum*, *Botrychium matricariæfolium*, *Wolffia*, and various species of *Carex*.

SWAMP AT ADAMS BASIN.

The swamp near Adams Basin has furnished many interesting species. It comprises several pieces of low land separated by cultivated fields, and in extent, including the fields, is about half a mile from north to south, and nearly as far east and west. The land surrounding it is rolling, and on the east are low hills, the termination of the range which may be traced south-eastward to the Pinnacle hills at Rochester. Underlying, at a depth of fifteen feet, is the Medina sandstone. The water supply is from several small streams, which, passing through the swamp, finally empty into Salmon creek. Numerous springs also give a never-failing supply, especially to the lower swamp. Efforts have been made, with some success, to drain the land, and probably before many years this station will be entirely lost. A variety of forest trees—maple, ash, oak, birch and tamarack—formed a dense wood formerly, but, except in the lower swamp, few of the larger trees remain. Their space has been taken up in the middle swamp by a luxuriant growth of *Myrica cerifera*. The lower swamp rises slightly along the southern edge, and here beech, hickory and white pine are growing. North and east it is lower and covered with tamarack, birch, hemlock, and an abundant growth of *Rhus venenata*. The plants are those peculiar to cold bogs, and many are not

found nearer than Bergen or Mendon. Among those found here, but rarely or not at all in adjacent forests, may be noted: *Clematis Virginiana, Coptis trifolia, Drosera rotundifolia, Flœrkia proserpinacoides, Rhus venenata, Saxifraga Pennsylvanica, Cornus Canadensis, Viburnum Opulus, Solidago ulmifolia, Senecio aureus, Lobelia spicata, Gaylussacia resinosa, Vaccinium corymbosum, Rhododendron nudiflorum, Ledum latifolium, Trientalis Americana, Bartonia tenella, Menyanthes trifoliata, Myrica cerifera, Larix Americana, Habenaria tridentata, H. psycodes, Spiranthes latifolia, Calopogon pulchellus, Liparis Læselii, Cypripedium spectabile, C. acaule, Smilax hispida, Smilacina trifolia, Lilium Canadense, Eriophorum polystachyon, Carex polytrichoides, Triticum caninum, Ophioglossum vulgatum.*

Several other plants of the scarcer species occur near this station. The walking fern, *Camptosorus rhizophyllus*, is quite abundant at two points within three or four miles. A square of twenty feet of the chain fern, *Woodwardia Virginica*, was found here in 1894. No other station for it except Mendon has been reported in the county. *Cassandra calyculata* is very abundant two miles south-east of the village. The eastern limit of the papaw, *Asimina triloba*, seems to be within Monroe county. Several groups are growing in Parma, north of Adams Basin, in Sweden, and thence westward. The trees spread by root sprouts, forming dense groups from three to twenty feet high, but all connected at the root. Seedlings seem to be scarce, although the trees are usually well fruited.

BERGEN SWAMP.

Bergen swamp has long been considered one of the most interesting botanical points in western New York. It lies in the north-eastern part of the town of Bergen, Genesee county, between the West Shore railroad and Black creek, about twenty miles from Rochester, and is one of a succession of swamps which occupy a depression extending from the Genesee river to the Niagara river. Through the western part of this valley flows Tonawanda creek; Black creek drains the eastern portion. Bergen swamp lies upon the divide between these two streams.

This swamp consists of an open portion containing one hundred or more acres, surrounded by a belt of woods from twenty to one hundred rods in width. The open part is mainly a marl bed covered with a variety of grass-like plants, chiefly sedges, with patches of *Sphagnum* and a few dwarf cedars (*Thuja*) and tamaracks. The sur-

rounding belt of land is covered with a dense jungle of cedars and tamarack, with here and there on drier portions a few pines. Willows and other marsh-growing shrubs help to make up the dense undergrowth. Farther to the north, near Black creek, the conifers give place to a heavy growth of elms and soft maple. On the south-east is a low, sandy ridge, known as Torpy Hill, one end of which is covered with "hard wood," mostly beech, and a few hemlocks. A similar ridge is found on the north-west.

The flora of Bergen swamp is very different from that of the surrounding country, and is characteristically northern. Here are found many rare plants, some of which do not appear to occur elsewhere in western New York, and others which have been reported only at Bergen, Mendon and Adams Basin. Among those peculiar to Bergen are: *Lonicera cærulea*, *Solidago neglecta* var. *linoides*, *S. Houghtonii*, *Senecio aureus* var. *Balsamitæ*, *Micrositylis monophyllos*, *Corallorrhiza innata*, *Goodyera repens*, *Arethusa bulbosa*, *Calypso borealis*, *Cypripedium candidum*, *Listera cordata*, *Clintonia borealis*, *Tofieldia glutinosa*, *Eleocharis rostellata*, *E. pauciflora*, *Scirpus cæspitosus*, *Carex filiformis*, *C. Crawei*, *C. flava* var. *viridula*, *C. Saltuensis*, *C. echinata* var. *microstachys*, *Dalibarda repens*, *Salix lucida* var. —— ?

RAVINE AT HOLLEY.

A few rods east of the station at Holley the railroad crosses a narrow ravine, a hundred or more feet in depth and extending south about one-half mile. Further south the stream which traverses the ravine flows over the comparatively hard rocks of the Clinton limestone, but the gorge is cut through the Medina sandstone. There appears to be nothing in the soil or the topography which should make it particularly interesting to the botanist, yet it is doubtful if there is another locality in Western New York of equal size on which so great a variety of ferns has been found Within a radius of much less than a mile have been gathered thirty species of ferns (including *Botrychiums*). The following are some of the rare ones which have been found in this locality: *Polypodium vulgare*, *Phegopteris Dryopteris*, *Asplenium Ebeneum*, *A. trichomanes*, *Camptosorus rhizophyllus* (growing on sandstone), *Aspidium Goldianum*, *Dicksonia pilosiuscula*, *Botrychium lanceolatum*, *B. matricariæfolium*, and *B. ternatum*.

Among flowering plants found at Holley may be mentioned *Jeffersonia diphylla*, *Acer spicatum*, *Lobelia cardinalis*, *Diervilla trifida*, and *Taxus Canadensis*.

Introduction of Species.

The number of introduced plants increases every year. In the Flora of the State of New York, published in 1843, the number of introduced plants for the whole State is given as 160. The number in this list is 263, of which seven are indigenous to the State, though they are introductions to Monroe county. Several of these newly introduced plants come from the West, and it has been noted that species new to this district are frequently found along railroad tracks and in lumber yards. Some species have increased so rapidly that they have already become a nuisance, and others threaten to become so. Among the former may be particularly mentioned *Chrysanthemum Leucanthemum*, *Daucus carota*, and *Plantago lanceolata*. *Melilotus officinalis* and *M. alba*, which a few years ago were but rarely seen are becoming very plentiful along the roadsides and in waste places. *Hieracium aurantiacum* has been reported in but few localities thus far, but where it has become established it has multiplied with great rapidity. *Lactuca Scariola* was first noticed only a few years since, but is now very frequent and in some places abundant. *Cichorium Intybus* is a common weed. *Cenchrus tribuloides* is rapidly spreading eastward along the Central railroad. *Trifolium hybridum* is becoming quite as common in fields and along roadsides as *T. repens*.

As Rochester has been for many years a center of the "nursery business", the frequent occurrence of exotic shrubs and trees throughout the city and its suburbs is a natural result. In the case of nurseries which have been abandoned on account of the growth of the city, these foreign trees and shrubs are sometimes left to grow as if spontaneously. In many such cases it is difficult to draw the line between plants which should or should not be included in the list. For example, in abandoned nursery grounds on North Union, Prince and Augusta streets the following trees and shrubs are now growing: *Tilia Europœa*, *Quercus Robur*, *Castanea sativa*, *Fagus sylvatica*, *Salix Caprea*, *Populus dilatata*, and *Juniperus Virginiana* var. *prostrata*. Where these plants seem to have become so firmly established that they would doubtless propagate if undisturbed, they have been numbered in the list.

Disappearance of Species.

Pinguicula vulgaris, reported by Dr. Chester Dewey and Dr. C. M. Booth as growing on the rocks near the Genesee Falls, is extinct.

The following species have not been reported of late years. It is hoped that some of our botanists will re-discover them:

Euonymus Americanus. (Sartwell.)
Polygala sanguinea. (Bradley.)
Baptisia australis. (Eaton.)
Spiræa tomentosa. (Holzer.)
Ribes prostratum. (Holzer.)
Œnothera fruticosa. (Booth.)
Helianthus strumosus var. mollis. (Bradley.)
Gentiana puberula. (Fish, Fuller.)
Hydrophyllum appendic. (Bradley.)
Mimulus alatus. (Bradley.)
Buchnera Americana. (Bradley.)
Polygonella articulata. (Bradley.)
Quercus ilicifolia. (Holzer.)
Abies balsamea. (Holzer.)
Limnobium spongia. (Bradley.)
Habenaria ciliaris. (Booth, Fuller, Bunker.)
Scleria pauciflora. (Bradley.)
Carex Richardsonii. (Bradley.)
Glyceria elongata. (Holzer.)
Bromus racemosa. (Holzer.)

Forest Trees.

The trees of the Genesee region have been widely known and have received frequent mention from the very earliest settlement of the country. The elms and the oaks have been particularly noted. The "Big Tree", or "Wadsworth Oak", was an object of reverence to the Indians as well as a landmark to the white settlers, and this with the "Markham Elm" have been frequently mentioned as magnificent specimens of forest growth. The elms in and about Rochester have been said to far exceed in beauty the celebrated Pittsfield elms. The course of nature and the ruthless hand of man have robbed us of most of these forest kings, but many fine specimens are yet to be found within our territory.

The primitive forest of the region was largely composed of maple, beech, ash, oak, elm, basswood, hickory, chestnut, cherry, pine, poplar, butternut, black walnut and sycamore. Other less abundant species were hemlock, tulip tree, birch, tamarack and spruce. Pine trees formerly covered the table land adjoining Irondequoit bay, and a sycamore swamp fringed the city on its western border, but only here and there a solitary specimen is now left to represent these once abundant species

In the vestiges of forests which remain, maple, beech, ash, oak, elm, basswood, hickory, iron-wood, chestnut, witch-hazel and dogwood are the most plentiful trees; while cherry, birch, poplar and butternut are less frequent. Sassafras is found on hills, river banks and in ravines. Hemlock occurs in low woods and along river banks. Arbor vitæ is common in swamps and frequent along the river banks. Larch is common in swamps. The tupelo is scarce, and the hack-

berry, papaw and tulip-tree are rare. Red cedar is found on the hills and the river bank, but is rare. Black spruce is found occasionally in swamps, but is scarce.

Statistics of the Flora.

The important groups and species in our flora will appear in the following tables, which in all cases include only phanerogams.

The list includes several groups of specific and varietal names, which are tabulated as follows:

Species native to the Monroe Flora	948	
Species introduced to the Monroe Flora	250	
Total number of species		1198
Varieties—native	103	
introduced	13	
Total of numbered species and varieties		1314
Species spontaneous but not established	36	

The total number of species and varieties reported in Monroe county is 1208. In the other counties represented in the list, 106 species are reported which, up to the present time, have not been found in Monroe county.

In all the following tables the numbered forms only are included.

SYSTEMATIC DISTRIBUTION.

The native and introduced species and varieties in this flora may be tabulated as follows:

	Genera.		Species and Varieties.	
Polypetalæ	167		393	
Gamopetalæ	158		385	
Apetalæ	43		134	
Total Dicotyledones		368		912
Monocotyledones	116		390	
Gymnospermæ	8		12	
Total Phænogamia		492		1314

LEADING ORDERS.

The following table shows the number of genera, species and varieties in some of the most largely represented orders:

	Orders.	Genera.	Species.	Species and Varieties.
1.	Cyperaceæ	9	115	143
2.	Compositæ	43	127	140
3.	Gramineæ	44	97	107
4.	Rosaceæ	15	56	62
5.	Leguminosæ	20	52	55
6.	Orchidaceæ	16	41	41
7.	Labiatæ	22	37	39
8.	Scrophulariaceæ	15	33	36
9.	Liliaceæ	20	34	34
10.	Cruciferæ	15	31	33
11.	Ranunculaceæ	13	26	33
12.	Ericaceæ	16	30	30
13	Polygonaceæ	4	26	28
14.	Salicaceæ	2	25	27
15.	Umbelliferæ	18	24	24
16.	Cupuliferæ	8	22	24
17.	Caryophyllaceæ	9	21	21
18.	Caprifoliaceæ	7	19	20
19.	Naiadaceæ	5	18	19

LEADING GENERA.

The following table is arranged according to the number of species and varieties.

	Genera.	Species.	Species and Varieties.
1.	Carex	77	102
2.	Aster	22	26
3.	Salix	19	21
4.	Solidago	18	20
5.	Polygonum	17	19
6.	Juncus	9	15
7.	Ranunculus	9	14
8.	Viola	9	14
9.	Potamogeton	13	13
10.	Desmodium	12	12
11.	Habenaria	12	12
12.	Galium	10	12
13.	Panicum	10	12
14.	Veronica	11	11
15.	Quercus	10	11
16.	Potentilla	9	10

COMPARATIVE STATISTICS.

To PROFESSOR WILLIAM R. DUDLEY'S Catalogue of "The Cayuga Flora," published in 1886, we are indebted, in part, for the figures in the three following tables:

Plants of Monroe County, etc.	1314
The Cayuga Flora	1278
Plants of Buffalo, etc. (with addenda)	1243
Plants of Oneida County, etc.	1390
Plants of Dutchess County	1067
Plants of Suffolk County	852
Flora of Washington, D. C., etc.	1211
Flora of Essex County	1257
Flora of Vicinity of Yale College	1238

It should, perhaps, be said in explanation, that "Plants of Oneida County and Vicinity," by JOHN E. PAINE, JR, 1864, in reality covered nearly the whole State, excepting the south-eastern and the Adirondack regions; and that the "Plants of Buffalo and Vicinity," by the Buffalo Society of Natural History, 1883, includes plants within a radius of fifty miles of Buffalo.

The following is a comparison of the larger orders:

Order.	No. Species and Varieties.							
	E. U. S.	Monroe.	Cayuga.	Buffalo.	Oneida.	Pine Plains.	Suffolk.	Washington.
Cyperaceæ	357	143	151	115	187	138	79	108
Compositæ	497	140	125	151	141	109	119	149
Gramineæ	297	107	107	95	110	92		110
Rosaceæ	104	62	69	55	62	48	35	46
Leguminosæ	208	55	45	47	54	34	41	57
Ranunculaceæ	80	33	36	39	36	27	17	27
Orchidaceæ	71	41	35	35	42	30	15	24
Ericaceæ	89	30	35	29	29	33	28	26
Cruciferæ	76	33	34	37	32	27	32	34
Labiatæ	121	39	33	43	40	27	31	42

The above estimates for the eastern United States (E. U. S.) are taken from Lester F. Ward's "Flora of Washington."

The following table gives a comparison of two of the larger genera, two of the representative Atlantic coast genera and a repre-

sentative northern species, in respect to the number of species in these different sections:

Genus.	Floras with the number of species and varieties in each.						
	Monroe.	Cayuga.	Buffalo.	Oneida Co.	Pine Plains.	Suffolk Co.	Washington.
Carex	97	112	80	130	102	33	70
Aster	25	24	24	29	20	20	21
Eupatorium	3	4	3	6	4	10	12
Utricularia	5	4	3	6	3	9	2
Habenaria	12	12	10	16	9	3	4

The number of woody plants, including woody vines such as Clematis and Menispermum, and excluding such as Chimaphila and Gaultheria, is given below. Only so-called species are considered, and these are compared with the numbers given in Sargent's Forest Trees of North America, Tenth Census, Vol. IX.

	Monroe Flora.	United States.
Total number of species	203	
Native species	171	
Introduced species	32	
Native arborescent species	80	412
Introduced " "	19	

AFFINITIES OF THE MONROE FLORA.

GENERAL COMPARISON.

Fortunately for the comparative study of our flora two lists of plants have been published, covering territory both east and west of this area.

The "Plants of Buffalo and Vicinity" was published by the Buffalo Society of Natural History under the authorship of DR. DAVID T. DAY. The list was not confined to any particular territory, but was extended from Buffalo east and south so as to include fields of botanical interest which the Society had studied. For example, the swamp at Bergen, in the eastern edge of Genesee County, is included, although it is fifty miles from Buffalo. This swamp is only twenty miles from Rochester, not far from the line of Monroe County,

and is properly included in our district. The Buffalo list also includes the plants of Portage, on the middle valley of the Genesee river, forty-five miles from Buffalo, in an air-line, and sixty-three miles by the Erie railway.

As the area included in the Buffalo list overlaps the proper territory of our Monroe flora, a just comparison cannot be drawn without making some explanations and eliminating some species.

The total number of species enumerated in the Buffalo list is 1289. Of these not less than 46 are credited to the Bergen swamp only, or to other localities within our Monroe flora territory. To make a proper comparison, all the species should be excluded from the Buffalo list which are credited simply to the far-removed localities, like Bergen and Portage.

The "Cayuga Flora" was published in 1886 by PROFESSOR W. R. DUDLEY, of the Botanical Department of Cornell University. The territory of this list has natural geographic boundaries, and is nominally the hydrographic basin or drainage area of Cayuga lake. It covers an area of nearly 1200 square miles, and includes a considerable variety of topography and range of altitude, as well as deep east-west ravines and other features affecting the flora. The temptation to include the peculiar flora of the West Junius ponds, which are outside of the limits of the Cayuga basin, was so strong that Professor Dudley yielded in so far as to include it with explanation. He also notes species and varieties in the Seneca lake basin, but with conscientious and scientific spirit he does not give them standing by numbering them in the list.

The total number of species and varieties in the Cayuga flora is 1278.

The region covered by the Monroe county list has but little topographic variety or other physical features to modify the flora and multiply species. The large total number, 1309, is due to the thorough explorations of so many collectors, extending over many years. Species are not included concerning which there are any serious doubts. The list would have been materially lengthened had we included all the species fairly reported, and all "escapes" which have been seen growing spontaneously. In these respects great care has been exercised, and the error has been rather in excluding species which might be entitled to recognition.

In the following lists will be found the comparison of the three floras, the territory of the Buffalo list lying contiguous upon the west

and the Cayuga area not far removed upon the east. In these lists the plants of Bergen swamp, Portage, Avon and Caledonia, are not credited to the Buffalo list.

COMPARISON WITH THE CAYUGA FLORA.

Plants common to the Monroe and Cayuga Floras, not reported in the Buffalo List.

Ranunculus septentrionalis,
Nymphæa odorata var. minor,
Nuphar Kalmianum,
Nasturtium palustre var. hispidum,
Lepidium ruderale,
Lepidium campestre,
Viola blanda var. renifolia,
Stellaria graminea,
Hypericum Canadense var. majus,
Rhamnus cathartica,
Negundo aceroides,
Polygala verticillata var. ambigua,
Trifolium agrarium,
Tephrosia Virginiana,
Prunus domestica,
Prunus pumila,
Prunus avium,
Fragaria Virginiana var. Illinoensis,
Potentilla Canadensis var. simplex,
Pyrus arbutifolia,
Cratægus tomentosa var. pyrifolia,
Cratægus punctata,
Ribes rotundifolium,
Ribes rubrum,
Sedum ternatum,
Drosera intermedia,
Lythrum Salicaria,
Thaspium aureum var. trifoliatum,
Chærophyllum procumbens,
Houstonia purpurea var. longifolia,
Galium trifidum var. pusillum,
Valeriana sylvatica,
Mikania scandens,
Solidago uliginosa,
Solidago neglecta,
Solidago neglecta var. linoides,
Solidago Ohioensis,
Sericocarpus conyzoides,
Aster corymbosus,
Aster undulatus,
Aster diffusus var. hirsuticaulis,
Aster junceus,
Aster puniceus, var. with purple stems, nearly smooth, and flowers pinkish.
Polymnia Uvedalia,
Coreopsis discoidea,
Cnicus muticus,
Cnicus arvensis var. albiflorus,
Tragopogon porrifolius,
Tragopogon pratensis,
Hieracium aurantiacum,
Kalmia latifolia,
Kalmia angustifolia,
Bartonia tenella,
Veronica Buxbaumii,
Pinguicula vulgaris,
Pycnanthemum incanum,
Thymus vulgaris,
Monarda clinopodia,
Monarda fistulosa var. rubra,
Monarda fistulosa var. mollis,
Amarantus paniculatus,
Rumex crispus × R. obtusifolius,
Polygonum dumetorum var. scandens,
Celtis occidentalis,
Carya sulcata,
Carya microcarpa,
Quercus Prinus,
Salix amygdaloides,
Salix lucida var. —— ?
Salix alba var. vitellina × S. lucida,
Salix Babylonica,
Salix candida,
Salix cordata × S. sericea,
Ceratophyllum demersum,
Pinus rigida,

Habenaria tridentata,
Habenaria ciliaris,
Habenaria blephariglottis,
Hypoxys erecta,
Ornithogalum umbellatum,
Trillium cernuum,
Juncus tenuis var. —·— ? tall, with crowded glomerate heads,
Juncus alpinus var. insignis,
Typha latifolia var. elongata,
Sagittaria variabilis var. obtusa,
Sagittaria variabilis var. latifolia,
Sagittaria variabilis var. angustifolia,
Sagittaria variabilis var. diversifolia.
Sagittaria variabilis var. gracilis,
Sagittaria heterophylla,
Sagittaria heterophylla var. elliptica,
Potamogeton fluitans,
Potamogeton amplifolius,
Potamogeton prælongus,
Potamogeton crispus,
Naias marina var. recurvata,
Cyperus aristatus,
Eleocharis rostellata,
Eleocharis intermedia,
Eleocharis pauciflora,
Scirpus Smithii,
Eriophorum cyperinum var. laxum,
Eriophorum alpinum,
Eriophorum Virginicum var. album,
Eriophorum polystachyon,
Scleria verticillata,
Carex lupulina var. pedunculata,
Carex monile,
Carex retrorsa var. Hartii,
Carex lurida,
Carex hystricina,
Carex scabrata,
Carex fusca,
Carex glaucodea,
Carex pallescens—the undulata form,
Carex oligocarpa,
Carex laxiflora var. latifolia,
Carex Careyana,
Carex tetanica,
Carex umbellata,
Carex Jamesii,
Carex decomposita,
Carex teretiuscula,
Carex teretiuscula var. major,
Carex alopecoidea,
Carex rosea var. radiata,
Carex echinata var. microstachys,
Carex straminea,
Carex straminea var. mirabilis,
Panicum Crus-galli var. muticum,
Anthoxanthum odoratum,
Oryzopsis Canadensis,
Muhlenbergia sobolifera,
Alopecurus pratensis,
Cinna pendula,
Holcus lanatus,
Deschampsia cæspitosa,
Trisetum palustre,
Elusine Indica,
Eatonia Dudleyi,
Eragrostis reptans,
Eragrostis capillaris,
Poa debilis,
Festuca ovina,
Elymus Canadensis var. glaucifolius.

COMPARISON WITH THE BUFFALO FLORA.

Plants common to the Monroe and Buffalo Floras, not reported in the Cayuga List.

Asimina triloba,
Corydalis flavula,
Nasturtium lacustre,
Sisymbrium Thaliana,
Brassica campestris,
Brassica rapa,
Thlaspi arvense,
Lepidium intermedium,
Cakile Americana,
Lechea major,
Viola tricolor var. arvensis,
Saponaria Vaccaria,

Silene Cucubalus,
Lychnis coronaria,
Malva crispa,
Oxalis corniculata,
Ptelea trifoliata,
Euonymus atropurpureus,
Euonymus Americanus,
Euonymus Americanus var. obovatus,
Polygala Senega var. latifolia,
Trifolium arvense,
Desmodium canescens,
Lespedeza Steuvei var. intermedia,
Lathyrus maritimus,
Strophostyles angulosa,
Cassia chamæcrista,
Potentilla supina,
Rosa nitida,
Lythrum alatum,
Thaspium barbinode,
Coriandrum sativum,
Symphoricarpus vulgaris,
Houstonia purpurea var. ciliolata,
Galium Mollugo,
Valerianella chenopodifolia,
Aster azureus,
Aster multiflorus,
Aster puniceus var. lucidulus,
Aster ptarmicoides,
Heliopsis scabra,
Artemisia Canadensis,
Artemisia vulgaris,
Artemisia biennis,
Senecio aureus var. Balsamitæ,
Cacalia atriplicifolia,
Onopordon Acanthium,
Silybum Marianum,
Lampsana communis,
Gaylussacia frondosa,
Steironema lanceolatum,
Asclepias verticillata,
Vincetoxicum nigrum,
Gentiana serrata,
Gentiana puberula,
Frasera Carolinensis,
Lithospermum hirtum,
Echium vulgare,
Solanum Carolinensis,
Physalis pubescens,
Nicandra physaloides,
Hyoscyamus niger,
Atropa Belladona,
Nicotiana rustica,
Mimulus alatus,
Veronica Chamædrys,
Hyssopus officinalis,
Origanum vulgare,
Scutellaria parvula,
Stachys palustris,
Amarantus hypochondriacus,
Euphorbia polygonifolia,
Euphorbia Helioscopia,
Euphorbia Lathrys,
Carya tomentosa,
Betula papyrifera,
Listera cordata,
Epipactis Helleborine,
Cypripedium candidum,
Smilax rotundifolia,
Allium cernuum,
Erythronium albidum,
Juncus Balticus var. littoralis,
Juncus nodosus var. megacephalus,
Juncus Canadensis var. coarctatus,
Cyperus diandrus var. castaneus,
Cyperus Schweinitzii,
Scirpus sylvaticus,
Carex triceps var. hirsuta,
Carex Crawei,
Carex Muhlenbergii,
Setaria Italica,
Cenchrus tribuloides,
Sporobolus cryptandrus,
Ammophila arundinacea,
Arrhenatherum avenaceum,
Bromus mollis,
Lolium temulentum.

COMPARISON OF CAYUGA AND BUFFALO FLORAS.

Plants common to the Cayuga and Buffalo Floras, not reported in the Monroe List.

Thalictrum purpurascens,
Ranunculus circinatus,
Ranunculus bulbosus,
Papaver Rhœas,
Fumaria officinalis,
Dentaria maxima,
Cardamine hirsuta var. sylvatica,
Arabis confinis,
Arabis lyrata,
Draba incana var. arabisans,
Draba verna,
Sisymbrium canescens,
Viola Selkerkii,
Cerastium viscosum,
Cerastium nutans,
Oxalis Acetosella,
Potentilla arguta,
Œnothera biennis var. muricata,
Mollugo verticillata,
Lonicera sempervirens,
Lonicera hirsuta,
Valeriana officinalis,
Bellis perennis,
Aster Novi-Belgii ?
Coreopsis trichosperma,
Tanacetum vulgare var. crispum,
Artemisia Abrotanum,
Centaurea Cyanus,
Hieracium Gronovii,
Lactuca integrifolia,
Pyrola rotundifolia var. uliginosa,
Phlox paniculata,
Phlox maculata,
Myosotis arvensis,
Onosmodium Carolinianum,
Ipomœa Nil,
Cuscuta Epilinum,
Cuscuta inflexa,
Collinsia verna,
Blephilia hirsuta,
Lophanthus scrophulariæfolius,
Physostegia Virginiana,
Atriplex patulum var. littorale,
Euphorbia Esula,
Myrica asplenifolia,
Habenaria fimbriata,
Sisyrinchium anceps,
Lilium superbum,
Juncus acuminatus var. debilis,
Juncus Canadensis vr. brachycephalus,
Potamogeton marinus,
Scirpus planifolius,
Scirpus maritimus,
Carex pauciflora,
Carex folliculata,
Carex laxiflora var. plantaginea,
Carex canescens,
Carex canescens var. alpicola,
Alopecurus geniculatus,
Glyceria Canadensis.

LISTS OF PLANTS PECULIAR TO EACH OF THE THREE FLORAS.

Plants peculiar to the Monroe Flora, not reported in either the Cayuga or Buffalo Lists.

Ranunculus repens fl. pl.
Ranunculus abortivus var. micranthus
Ranunculus acris fl. pl.
Delphinium Ajacis,
Nelumbo lutea,
Nuphar advena var. minus,
Nasturtium sylvestre,
Barbarea præcox,
Viola tricolor,
Silene Virginica,
Lychnis Chalcedonica,
Arenaria Michauxii,
Buda rubra,
Geranium molle,

Erodium cicutarium,
Rhus copallina,
Polygala polygama,
Polygala sanguinea,
Baptisia australis,
Trifolium incarnatum,
Trifolium reflexum,
Trifolium procumbens var. minus,
Amorpha fruticosa,
Colutea arborescens,
Coronilla varia,
Desmodium pauciflorum,
Desmodium ciliare,
Spiræa tomentosa,
Potentilla Pennsylvanica,
Pyrus aucuparia,
Ribes nigrum,
Sedum reflexum,
Drosera linearis,
Œnothera fruticosa,
Bupleurum rotundifolium,
Apium graveolens,
Lonicera cœrulea,
Galium verum,
Vernonia altissima,
Solidago Houghtonii,
Solidago tenuifolia,
Aster dumosus,
Xanthium strumarium,
Echinacea angustifolia,
Rudbeckia hirta — form with brown bands at base of rays,
Helianthus strumosus var. mollis,
Calendula officinalis,
Chrysanthemum Leucanthemum var. tubuliflorum,
Artemisia caudata,
Cacalia suaveolens,
Centaurea benedicta,
Centaurea Jacea,
Hieracium Marianum,
Crepis biennis,
Crepis tectorum,
Lobelia spicata,
Campanula rotundifolia var. arctica,
Periploca Græca,
Hydrophyllum appendiculatum,
Symphytum asperrimum,
Lycopsis arvensis,
Solanum rostratum,
Physalis Alkekengi,
Linaria Canadensis,
Pentstemon lævigatus,
Pentstemon lævigatus var. digitalis,
Digitalis lanata,
Veronica spicata,
Buchnera Americana,
Gerardia purpurea var. paupercula,
Utricularia gibba,
Utricularia resupinata,
Mentha rotundifolia,
Mentha sativa,
Pycnanthemum muticum,
Calamintha Nepeta,
Blephilia ciliata,
Phlomis tuberosa,
Lamium album,
Stachys lanata,
Chenopodium Bonus-Henricus,
Rumex sanguineus,
Polyganum cilinode,
Polygonella articulata,
Arceuthobium pusillum,
Euphorbia corollata,
Urtica chamædryoides,
Betula populifolia,
Betula pumila,
Quercus Robur var. pedunculata,
Quercus ilicifolia,
Castanea sativa,
Fagus sylvatica,
Salix Caprea,
Salix humilis × S. discolor,
Juniperus Sabina var. procumbens,
Juniperus Virginiana var. prostrata,
Limnobium Spongia,
Calypso borealis,
Tipularia discolor,
Corallorhiza odontorhiza,
Corallorhiza striata,
Habenaria leucophæa,
Cypripedium arietinum,
Allium vineale,
Trillium sessile,

Tofieldia glutinosa,
Zygadenus elegans,
Juncus filiformis,
Juncus scirpoides,
Spargarium minimum,
Lemna perpusilla,
Triglochin maritima,
Eleocharis olivacea,
Eleocharis compressa,
Scirpus cæspitosus,
Scirpus subterminalis,
Scleria triglomerata,
Scleria pauciflora,
Carex Schweinitzii,
Carex Houghtonii,
Carex trichocarpa var. aristata,
Carex rigida var. Goodenovii,
Carex longirostris,
Carex conoidea,
Carex Saltuensis,
Carex Richardsonii,
Carex gynocrates,
Carex exilis,
Carex siccata,
Paspalum setaceum,
Andropogon Virginicus,
Hierochloa borealis,
Trisetum subspicatum var. molle,
Cynodon Dactylon,
Bouteloua racemosa,
Eragrostis pilosa,
Festuca elatior var. pratensis,
Bromus tectorum.

Plants peculiar to the Cayuga Flora, not reported in either the Monroe or Buffalo Lists.

Clematis verticillaris,
Anemone Virginiana var. alba,
Ranunculus Cymbalaria,
Dicentra eximia,
Corydalis aurea,
Brassica alba,
Brassica oleracea,
Lunaria biennis,
Dianthus barbatus,
Silene Pennsylvanica,
Lychnis vespertina,
Æsculus Hippocastaneum,
Lotus corniculatus,
Lespedeza procumbens,
Lespedeza violacea—an open, loosely panicled form, with large flowers,
Lespedeza violacea — form with thin leaves and slender stem,
Lathyrus venosus,
Gymnocladus Canadensis,
Gleditschia monosperma,
Prunus spinosa,
Spiræa lobata,
Fragaria vesca var. alba,
Gillenia trifoliata,
Rubus neglectus,
Rubus villosus var. frondosus,
Rubus villosus var. humifusus,
Agrimonia parviflora,
Rosa lucida,
Rosa cinnamomea,
Pyrus sambucifolia,
Cratægus coccinea var. macrantha,
Amelanchier — form agreeing partly with A. oligocarpa,
Saxifraga aizoides,
Ribes lacustre,
Hippuris vulgaris,
Callitriche heterophylla,
Rhexia Virginica,
Epilobium hirsutum,
Œnothera biennis var. grandiflora,
Levisticum officinale,
Sium cicutæfolium, *Gm.*, var. (S. lineare, *Mx.*, var. intermedium, *T.&G.*)
Aralia spinosa,
Lonicera Xylosteum,
Lonicera glauca — form — possibly a var. — (part of L. parviflora var. Douglassii),
Scabiosa australis,
Eupatorium sessilifolium,

Aster Novæ-Angliæ, var. with light blue flowers,
Aster diffusus var. thyrsoides,
Aster puniceus var. lævicaulis,
Zinnia elegans,
Helianthus strumosus, a form with narrowly lanceolate leaves, (the same in herb. J. J. Thomas as H. tracheliifolius,)
Bidens connata var. comosa,
Arctium Lappa var. minus,
Echinops Ritro,
Centaurea nigra,
Vaccinium Pennsylvanicum var. nigrum,
Vaccinium corymbosum vr. amœnum,
Vaccinium corymb. var. atrococcum,
Andromeda ligustrina,
Pyrola secunda var. pumila,
Primula Misstassinica,
Lysimachia punctata,
Asclepias incarnata var. pulchra,
Gentiana linearis,
Myosotis palustris,
Myosotis collina,
Borrago officinalis,
Asperugo procumbens,
Ipomœa coccinea,
Convolvulus sepium—form, possibly var. repens, *Gray*,
Cuscuta tenuifolia,
Lycopersicum esculentum,
Linaria Elatine,
Utricularia minor,
Catalpa bignonioides,
Trichostema dichotomum,
Mentha piperita var. subhirsuta,
Calamintha Acinos,
Lamium maculatum,
Stachys aspera var. glabra,
Plantago major var. minima,
Plantago cordata,
Plantago Media,
Anychia dichotoma,
Scleranthus annuus,
Amarantus chlorostachys,
Chenopodium rubrum,
Rumex Patientia,
Rumex conglomeratus,
Polygonum lapathifolium,
Polygonum lapathifolium var. incanum,
Aristolochia clematitis,
Parietaria Pennsylvanica,
Salix alba var. argentea,
Salix cordata × S. petiolaris,
Salix incana × S. cordata,
Pinus resinosa,
Goodyera Menziesii,
Pogonia verticillata,
Habenaria Hookeri—a form approaching var. oblongifolia,
Iris Pseudacorus,
Muscari botryoides,
Trillium erectum—a form near var. declinatum of *Gr. Man.*
Juncus effusus var. conglomeratus,
Juncus marginatus,
Juncus Gerardi,
Juncus articulatus var. obtusatus,
Sparganium simplex vr. androcladum,
Sagittaria heterophylla vr. angustifolia,
Potamogeton natans var. prolixus,
Potamogeton Pennsylvanicus,
Potamogeton Spirillus,
Potamogeton rufescens ?
Potamogeton (spec. doubtful : possibly Illinoensis),
Potamogeton Zizii,
Potamogeton perfoliatus var. lanceolatus,
Potamogeton Hillii,
Potamogeton obtusifolius,
Potamogeton pusillus var. tenuissimus,
Potamogeton mucronatus,
Potamogeton pectinatus var.——? with slender elongated stems,
Potamogeton pectinatus var. —— ? a gigantic form,
Naias marina,
Naias marina var. gracilis,
Cyperus Engelmanni,
Eleocharis ——, form allied to E. ovata,
Eleocharis palustris var. glaucifolius,
Scirpus sylvaticus var. digynus,

Carex Willdenovii,
Carex scoparia var. intermedia,
Carex lagopodioides var. moniliformis,
Carex adusta,
Carex straminea var. tenera f. erecta,
Carex aquatilis—form corresponding to the C. xerocarpa form of C. angustata,
Carex alata,
Carex angustata var. β, *Boott*,
Carex angustata var. strictior,
Carex angustata var. xerocarpa,
Carex Magellanica,
Carex granularis var. recta,
Carex triceps — the form C. hirsuta var. pedunculata, *S. & T.*
Carex virescens var. elliptica,
Carex platyphylla var. —— ?
Carex laxiflora var. intermedia,
Carex laxiflora var. blanda, and sub-var. minor,
Carex Emmonsii var. elliptica,
Carex debilis var. β, *Boott*,
Carex capillaris var. elongata,
Carex flava — the form "var. androgyna," *Olney*,
Carex Œderi,
Carex hirta,
Carex comosa × C. tentaculata,
Carex Pseudo-Cyperus × C. hystricina
Carex lupulina—a large, robust form,
Carex lupulina — a form with stalked and scattered fertile spikes,
Carex lupulina × C. retrorsa,
Carex utriculata var. minor,
Carex ampullacea var. sparsiflora,
Panicum xanthophysum,
Panicum commutatum,
Panicum microcarpon var. sphærocarpon,
Panicum dichotomum var. nitidum,
Panicum dichotomum var. pubescens,
Panicum miliaceum,
Setaria viridis var. purpurascens,
Muhlenbergia Mexicana var. filiformis,
Brachyelytrum aristatum — the form "var. Engelmanni,"
Calamagrostis Porteri,
Danthonia compressa,
Diplachne fascicularis,
Poa compressa var. sylvestris,
Poa sylvestris var. palustris,
Glyceria acutiflora,
Bromus ciliatus var. ——, approaching some of the Rocky Mountain forms,
Bromus sterilis,
Agropyrum caninum, (Triticum caninum,) — var. approaching T. violaceum,
Hordeum murinum,
Elymus striatus var. villosus,
Secale cereale.

Plants peculiar to the Buffalo Flora, not reported in either the Monroe or Cayuga Lists.

Adonis autumnalis,
Ranunculus ambigens,
Helleborus viridis,
Nigella Damascena,
Argemone Mexicana,
Dicentra Cucullaria × D. Canadensis,
Arabis dentata,
Cleome integrifolia,
Reseda odorata,
Reseda alba,
Viola Cucullata var. longipes,
Silene Gallica,
Silene nocturna,
Portulaca grandiflora,
Calandrinia Menziesii,
Hypericum Kalmianum,
Malva Alcea,
Sida spinosa,
Linum striatum,
Geranium dissectum,
Geranium columbinum,
Ilex monticola,
Polygala incarnata,
Glycerrhiza lepidota,

Onobrychis sativa,
Lathyrus pratensis,
Geum macrophyllum,
Poterium Sanguisorba,
Rosa micrantha,
Rosa spinosissima,
Hydrangea arborescens,
Torilis Anthriscus,
Æthusa Cynapium,
Anthriscus cerefolium,
Berula angustifolia,
Erigenia bulbosa,
Lonicera parviflora var. Douglasii,
Liatris cylindracea,
Solidago bicolor var. concolor,
Solidago sempervirens,
Solidago rigida,
Aster patens,
Aster ericoides var. villosus,
Silphium laciniatum,
Silphium trifoliatum,
Ambrosia trifida var. integrifolia,
Ambrosia psilostachya,
Xanthium spinosum,
Echinacea purpurea, (?) possibly E. angustifolia,
Helianthus petiolaris,
Helianthus lenticularis,
Helianthus giganteus,
Coreopsis tinctoria,
Coreopsis aristosa,
Galinsoga parviflora,
Dysodia chrysanthemoides,
Matricaria Chamomilla,
Matricaria inodora,
Balsamita vulgaris,
Arctium Lappa var. tomentosa,
Cnicus altissimus,
Leontodon autumnalis,
Prenanthes crepidinea,
Lactuca hirsuta,
Kalmia glauca,
Steironema longifolia,
Syringa vulgaris,
Gentiana Andrewsii var. albiflora,
Polemonium reptans,
Heliotropium Europæum,
Ipomœa pandurata,
Physalis Philadelphica,
Verbascum Lychnitis,
Linaria Cymbalaria,
Antirrhinum Orontium,
Gerardia lævigata,
Martynia proboscidea,
Verbena angustifolia,
Verbena stricta,
Verbena bracteosa,
Mentha Canadensis var. glabrata,
Pycnanthemum linifolium,
Calamintha Nuttallii,
Salvia officinalis,
Salvia glutinosa,
Monarda fistulosa,
Dracocephalum parviflorum,
Ballota nigra,
Lamium purpureum,
Amarantus chlorostachys vr. hybridus,
Amarantus, (n. sp.?) resembling A. blitoides,
Amarantus spinosus,
Acnida tamariscina,
Chenopodium murale,
Chenopodium glaucum,
Chenopodium ambrosoides,
Chenopodium ambrosoides var. anthelminticum,
Corispermum hyssopifolium,
Rumex altissimus,
Rheum Rhaponticum,
Euphorbia platyphylla,
Quercus stellata,
Quercus palustris,
Salix tristis,
Ceratophyllum demersum var. echinatum,
Habenaria blephariglottis, var. holopetala,
Dioscorea villosa,
Allium cernuum,
Clintonia umbellata,
Tradescantia Virginica,
Juncus Canadensis var. subcaudatus,
Sagittaria heterophylla var. rigida,
Potamogeton hybridus,

Potamogeton pauciflorus var. Niagarensis,
Eriocaulon septangulare,
Scirpus Clintonii,
Scirpus Torreyii,
Carex oligosperma,
Carex tenuiflora,
Panicum agrostoides,
Panicum Xalapense ?
Triodia purpurea,
Eatonia obtusata,
Eragrostis Purshii.

Physical Characters of the Region.

BY HERMAN LEROY FAIRCHILD.

GEOGRAPHY AND HYDROGRAPHY.

The territory covered by this list of plants has no natural boundaries. It includes the county of Monroe and portions of each of the adjacent counties. The arbitrary limits of the map (Plate 1) include the western part of Wayne county, the western half of Ontario, the northern part of Livingston and eastern parts of Genesee and Orleans counties. The northern boundary is Lake Ontario. The 43d parallel of north latitude bisects this area, and the meridian of 78° passes through the western portion. The breadth of the area north and south along the western border is 35 miles, and the length east and west is 44 miles. The total land surface is about 1400 square miles.

The drainage is wholly into Lake Ontario. The Genesee river traverses the area of the map in a direction N.N.E. and debouches into the lake near the middle of the north shore boundary. The area includes the hydrographic basin of the lower Genesee from the lake to a parallel five miles above Avon. In the last ten miles of its course the Genesee river occupies a new channel and has no valley or tributaries of consequence, all the northern part of the area draining by numerous streams directly into the lake. The south-eastern side of the area is drained by Mud creek and Canandaigua outlet, the water entering lake Ontario by Oswego river.

TOPOGRAPHY AND ALTITUDES.

The area is mostly a plain, sloping gently toward Lake Ontario. The total difference of elevation between the higher ground at the south and the northern edge of the plain at the lake is in general 300 to 400 feet. The average altitude of the area is about 600 feet above tide. The middle portion through the whole east and west extent, as traversed by the West Shore and New York Central railroads, has an

altitude of about 500 feet. The north border, traversed east and west by the Rome, Watertown and Ogdensburg railroad, is about 350 feet above tide and 100 feet above lake Ontario. South of the area lies the lofty table-land in which have been carved the valleys of lakes Conesus, Hemlock, Canadice, Honeoye and Canandaigua, the western members of the so-called "finger lakes". Some of the hills in this high region are 2000 feet above sea-level.

The northern part of the area is a comparatively smooth plain drained directly into Lake Ontario by many small streams which, near the lake, have cut into the Iroquois lake-deposits and the subjacent ice-drift. The continuity of the plain is entirely broken by the recently excavated ravine of the Genesee, 200 feet deep, and by the preglacial valley of Irondequoit bay.

The eastern and southern portions of the area have a hilly topography, produced by the glacier rubbing the deep subglacial drift into elongated hills, parallel with the ice movement, known as "drumlins" or "drumloids". In the eastern part of Monroe county these drumloid ridges are very pronounced. They have a north and south trend, and culminate south of Fairport in the Turk hill drumloid mass. Through Henrietta and Rush, in the southern part of Monroe county, the drumloids have a direction some ten to fifteen degrees west of south, while along the Genesee river and in the south-west part of the territory these ridges have a trend more nearly south-west. In the north-west part of the area the drumloid character is merely discernible in the broad, smooth swells, with a north-east by south-west trend.

List of Elevations above Ocean Level.

LAKES.	Feet.
Ontario	247
Canandaigua	687
Mendon Ponds	662–655

ERIE CANAL—(WATER SURFACE).

Between Lock	60,	Macedon, and Lock	61,	Upper Macedon	454
" "	61	" "	62,	Pittsford	461
" "	62	" "	63,	Miller's	470
" "	63	" "	64,	Sipple's	479
" "	64	" "	65,	Reservoir	489
" "	65	" "	66,	first east of Rochester.	499
Through Rochester and westward					508

RAILROAD LINES—EAST AND WEST DIRECTIONS.

Rome, Watertown and Ogdensburg Railroad :

	Feet.		Feet.
Williamson	418	Charlotte	258
Ontario	413	Greece	275
Lakeside	426	Parma	278
Union Hill	424	East Hamlin	290
Webster	406	Hamlin	308
Forest Lawn	285	East Kendall	324
Sea Breeze	268	Kendall	326
Windsor Beach	270		

New York Central and Hudson River Railroad, main line :

Palmyra	435	Rochester	515
Walworth	450	Chili	564
Macedon	468	Churchville	568
Fairport	455	Bergen	603
Penfield	417	West Bergen	680
Brighton	459	Batavia	891
East Rochester	482		

Batavia and Canandaigua Branch of N. Y. C. & H. R. R.:

Canandaigua	735	West Rush	555
East Bloomfield	876	Genesee Valley Junct'n.	536
Miller's Corners	889	Caledonia	652
Honeoye Falls	664	LeRoy	866

Lehigh Valley Railroad :

Manchester	606	East Rush	559
Victor	567	Genesee river crossing	563
Mendon	572	Caledonia	666
Rochester Junction	557	North LeRoy	805

RAILROAD LINES—NORTH AND SOUTH DIRECTIONS.

Rochester and Ontario Branch of N. Y. C. & H. R. R.:

Ontario Beach	250	Otis	519
Charlotte	251	Brown Street	522
Barnard's Crossing	399	Rochester	515

New York, Lake Erie and Western Railroad :

Rochester	510	Rush	541
Red Creek	525	Avon	586
West Henrietta	564	Conesus Lake Junction	870
Scottsville	558	South Lima	901

Western New York and Pennsylvania Railroad:

	Feet.		Feet.
Rochester	511	Honeoye Junction	537
Rapids	525	Avon	543
Severance	533	Fowlerville	561
Scottsville	541	York	561

MISCELLANEOUS HEIGHTS.

	Feet.
"Ridge Road" across Monroe county (Iroquois beach)	430 to 440
Turk hill station U. S. Lake Survey	928
Hart hill (town of Rush) station U. S. Lake Survey	792
Pinnacle hill station U. S. Lake Survey	749
Hopper hill (town of Victor, Ontario county) (aneroid)	1131+
"Pinnacle Hills:"	
Cobb's hill	663
Pinnacle summit	749
Mount Hope reservoir (water surface)	634
Memorial Pavilion	650
Summits of Mount Hope cemetery	650 to 670
Rochester:	
"Four Corners," Main and State streets	499
East Main street and East avenue	534
Campus of University of Rochester	516

GEOLOGY.

Stratigraphy.—The hard-rock geology of western New York was fully described over half a century ago by Dr. James Hall.* The section of strata in the region under immediate consideration has been recently published in these Proceedings,† while an excellent description of the strata above the Salina group may be found in the 47th Report of the New York State Museum, 1894.‡

The geological structure of the region is exceedingly simple. The strata lie nearly horizontal, without serious disturbance or visible faulting. While there has been some movement and warping of the

*"The Natural History of New York. Part IV, Geology of the Fourth District."

†"A Section of the Strata at Rochester, N. Y., as shown by a deep boring." By H. L. Fairchild, Proc. Roch. Acad. of Science, Vol. I, pp. 182–186, 1891.

"The Thickness of the Devonian and the Silurian Rocks of Western New York; approximately along the line of the Genesee River." By Charles S. Prosser, Proc. Roch. Acad. Science, Vol. II, pp. 49–104, 1892.

"The Geological History of Rochester, N. Y." By H. L. Fairchild, Proc. Roch. Acad. Science, Vol. II, pp. 215–223, 1893.

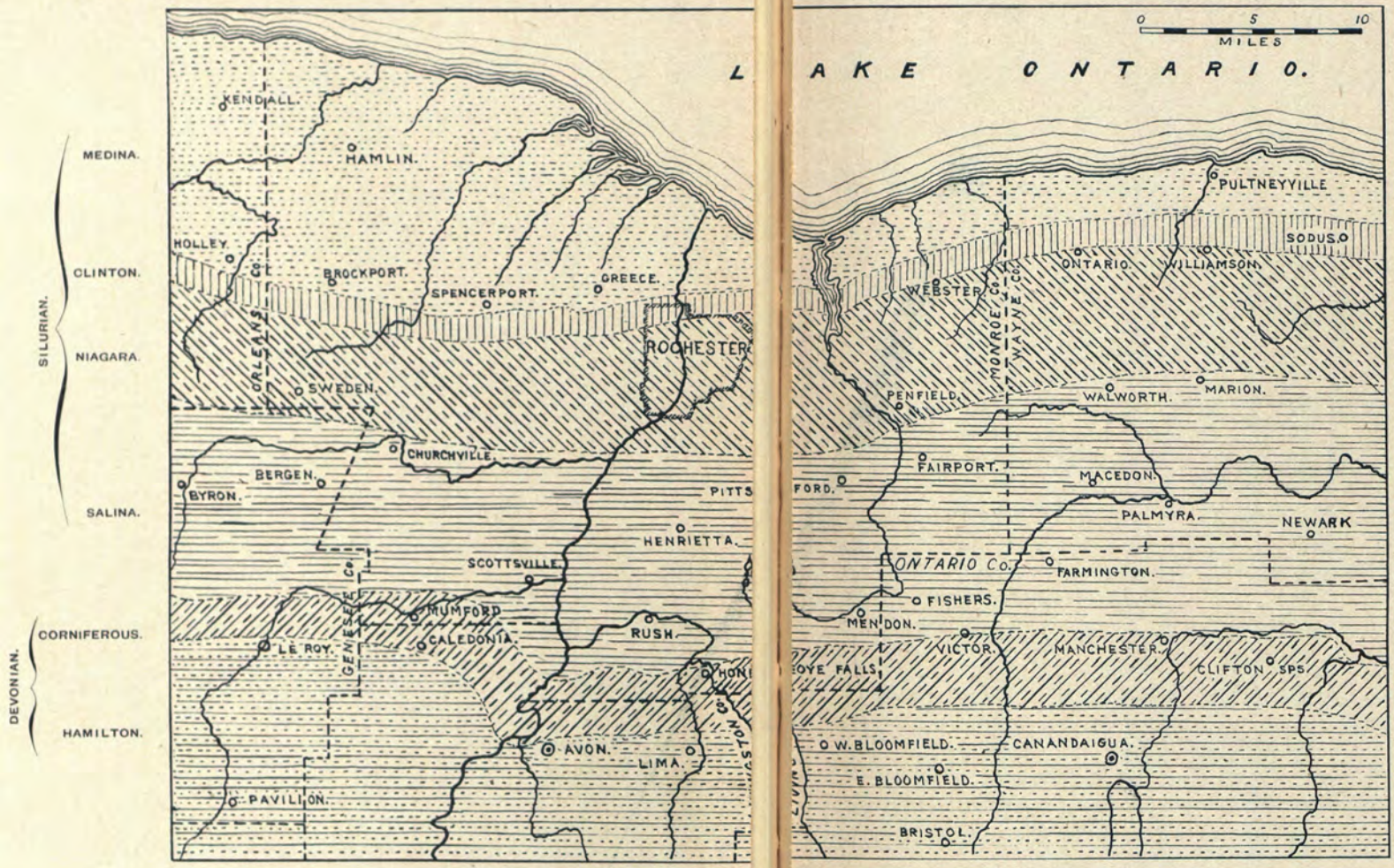
‡"Report on the Geology of the Livonia Salt Shaft." By D. D. Luther.

region, the strata have not been conspicuously displaced. There is a slight inclination or dip east of south, amounting at Rochester to less than 100 feet per mile. This dip causes each rock formation to disappear southward beneath the successively superior formations. The strike of the strata is, therefore, nearly east and west, and the several kinds of rock outcrop at the surface as bands stretching east and west across the area. The width of these bands of outcropping rocks varies from a fraction of a mile to several miles, according to their thickness. Over most of the region, however, the rock is rarely seen, even in stream channels, on account of the thick sheet of glacial and lake-drift which overlies it. The finest exposure of strata, and one of the most beautiful in this country, is seen in the lower ravine of the Genesee river, where the river having lost its old preglacial valley has cut for itself a new channel, eight miles long, through the sandstone, shales and limestones of the Niagara formation. The accompanying map and diagram will indicate the succession of the several rocks which underlie the region. (See Plate 2.)

The rocks of the whole of central and western New York are unaltered sedimentaries, of marine origin, consisting of sandstones, shales and limestones. They will be briefly referred to in the order of superposition, beginning with the lowest. The lowest visible rock is the Medina sandstone, which is at or near the surface in the north-western part of the area of the map, and is extensively quarried. This red Medina forms the rock bottom of the southern part, at least, of lake Ontario and the rock bluffs at all points along the south shore. Beneath Rochester the red Medina is over one thousand feet thick, but here and throughout the region, except the north-western portion of the lake border, it is buried under the shales and limestones of the Clinton group. The entire section of the Clinton is finely shown in the walls of the Genesee canyon at the lower falls in Rochester. Here it rests on the gray top of the Medina, and in ascending order consists of about 24 feet of the lower green shale; 14 feet of lower limestone, containing a bed of hematite iron-ore one foot thick; 24 feet of upper green and purple shales; and 18 feet of upper limestone.

The Niagara group rests upon the Clinton and consists of 80 feet of dark, gritty shales, exposed at the upper falls in Rochester, and 80 feet of limestone, upon which the city of Rochester is mainly built.

A very few miles south of Rochester the Niagara limestone ceases to be the superficial rock, and well-borings through the glacial



AREAL MAP SHOWING APPI

OXIMATE LIMITS OF STRATA.

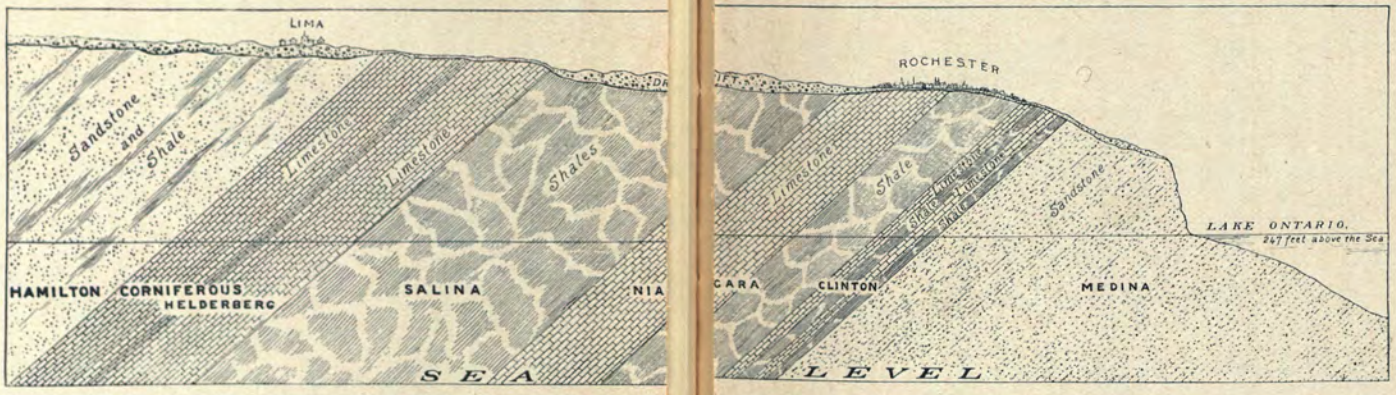


DIAGRAM OF VERTICAL

ORTH AND SOUTH SECTION.

(The inclination of strata is greatly exaggerated by the extreme dif

ference in scales. The true dip of strata is less than 100 feet per mile.)

STRATIGRAPHY OF MONROE CO

UNTY AND ADJACENT TERRITORY.

drift encounter first the shales of the Salina formation. These shales, which contain the salt deposits and stretch from Syracuse to the Niagara river, form a belt across our area quite as wide as the whole Niagara formation, (Niagara, Clinton, and Medina groups). Upon this meridian the total thickness of the shales, with some calcareous beds, is about 600 feet. Passing southward to the lower border of Monroe county the next successively higher rock, the Corniferous limestone, appears. It is about 140 feet thick, of hard and enduring character, and characterized by abundance of flint nodules. It has resisted glaciation and weathering better than the Salina shales, and so forms usually a definite escarpment at its northern edge, producing cataracts or rapids in the streams. Upon this formation the drift is thin, and in some localities, particularly near Caledonia and LeRoy, in Genesee county, there are extensive superficial quarries. The limestone outcrops over a belt of territory two to five miles wide.

The southern quarter of the area has the shales and sandstones of the Hamilton group as the superficial rock. These shales are dark and carbonaceous, and frequently yield rock-gas. With a capping of Portage sandstone they form the high table-land of the lake region south of the mapped area.

Pleistocene Drift.—The superficial geology of the region has not been described in detail, and will be treated here only in a general way. During the millions of years following the deposition of the Devonian rocks the region was continuously exposed to destructive atmospheric agencies, and by atmospheric decay and stream erosion a great thickness of rocks had doubtless been removed from this area.* At the close of the Pliocene period the climate, which had been slowly growing colder, produced a great accumulation of snow and ice over Canada and the north-eastern United States, and the subaerial denudation was changed to subglacial. The superficial decomposed rocks were crushed and removed by the southward moving ice-sheet, the old drainage channels were largely filled with the debris, and the final removal of the ice left a sheet of glacial drift over the whole territory.

The great glacier not only eroded the decomposed and exposed rocks of the region and spread the wreckage over the area to the south, but it brought in from the north, or north-east, the complex materials of the crystalline rocks of the Archean areas. Thus the

*Proc. Roch. Acad. Science, Vol. II, p. 221.

thick drift sheet which buries the region is of very heterogeneous composition and admirably adapted for sustaining vegetable growth.

At the beginning of the Glacial period the northern part of the continent was much above the present height in relation to the sea. During at least the closing part of the Glacial period western New York was depressed far below its present level, and following and laving the retreating ice-front was a huge glacial lake, which buried most of Monroe county to a depth of 350 to 400 feet, having its outlet past the site of Chicago to the Mississippi. This lake, produced by the closing of the lower eastern outlets by the ice-sheet, is called Lake Warren.* Subsequently, as the ice retreated northward and eastward, so as to uncover the Mohawk valley, this became an outlet of the glacial waters, and the water-surface fell to the level of the "Ridge Road", which is simply the beach of the glacial lake Iroquois,† with its outlet at Rome, N. Y., to the Mohawk and Hudson valleys.

Deposits of silts occur over the areas once covered by the glacial lakes. In some localities they form extensive flats, with clayey soil. In the depressions near Lake Ontario and in the valley of Irondequoit bay they constitute the soft deposits which by erosion have produced the conspicuous terraces and the mounds called "sugar loaves".

The superficial geology of the region is thus a complex result of the action of atmospheric agencies, glacial ice, stream drainage of the glacier, lake action at the ice-front and subsequent to the removal of the ice; and these followed by a resumption of the destructive forces of the atmosphere.

Over the geological formations of harder rock, like the Niagara limestone and Corniferous limestone, the glacial drift (till or boulder-clay) is relatively thin, and sometimes leaves the rock almost bare, while over the softer Salina there is a greater depth of the drift, which is largely piled into the elongated parallel hills called drumlins or drumloids, already described.

A frontal moraine, marking a pause in the recession of the ice-sheet, traverses the county from Brockport to Brighton. This is not strong, but well defined west of Rochester as an irregular ridge, cut by the main line of the New York Central railroad one mile north-east of Coldwater station. Along the Rapids road in the south-west part of

*See numerous writings of J. W. Spencer and Warren Upham in Amer. Jour. Sci.; Bull. Geol. Soc. Am., and other journals; Abstract by the writer in Bull. Geol. Soc. Am., Vol. 6, pp. 462–466.

†"History of the Niagara River", by G. K. Gilbert, in 6th Ann. Rep. of the Commissioners of the State Reservation at Niagara, for 1889, pp. 61–84, with plates, (also in the Smithsonian Ann. Rep. for 1890.)

the city the moraine becomes more broken, but between the river and Brighton it forms the most conspicuous hills of the region, the famous "Pinnacle Hills". These are mainly sand and gravel, with some masses of till or unassorted glacial drift and many large boulders. The sand and gravel beds in these hills show remarkably complex structure. To glacialists the hills have been well known but very puzzling. They are probably part of the frontal moraine, of the nature known as "kame".* They consist chiefly of the materials washed out of the glacier by the drainage and accumulated at the front of the ice-wall in the deep water of the glacial Lake Warren. Three other similar kame deposits are found in Monroe county, but not directly connected with any morainic ridge. One is the group of remarkable sand and gravel hills enclosing the Mendon ponds, another the sand hills and plains extending from the head of Irondequoit bay past Pittsford into the north-west corner of Ontario county. Another immense deposit lies in the north-west part of Ontario county and the extreme south-east corner of Monroe county. An area of sand knolls also occurs south-west of Rochester, toward Chili Center, the summits of which bear large ice-rafted boulders.

Glacial gravels are found in hundreds of localities over the county, and the lake silts are abundant, chiefly in depressions.

Irondequoit bay probably represents a preglacial river valley modified by ice-erosion, and then more or less filled by serving as a catchment basin during the ice retreat and the episodes of lake Warren and the later lake Iroquois. The sand hills at the head of the bay are remnants of the lake deposits, and the present conspicuous terraces at an elevation of about 400 feet on each side of the bay probably represent the Iroquois lake bottom.

Influence upon Plant Life.—The influence of the geologic conditions upon the plant life should be considered. In regions beyond the limits of ice-drift, where soils are the result of decay of rock in place and consist of the insoluble residue of the rocks, the several kinds of rock and consequent different soils are marked by more or less differences in the flora. In the area here considered such differences in the flora can scarcely be marked, because in the place of true soil there is the sheet of complex drift which masks the rocks and

*"The Kame-Moraine at Rochester, N. Y." By H. L. Fairchild, Amer. Geol., Vol. XVI, pp. 39–52, July, 1895.

"Eskers near Rochester, N. Y." By Warren Upham, Proc. Roch. Acad. Science, Vol. II, pp. 181–200.

gives uniformity to the plant-bearing conditions. Exceptions may be found in the areas of the Niagara and Corniferous limestones where the drift is very thin or entirely wanting. It is true that the drift partakes largely of the character of the rock formation underlying immediately northward. But in this region the bands of different rocks are not many miles in width, the changes in kind are frequent, and the constituents of the drift are fairly distributed. Moreover, the drift contains the product of the grinding and disintegration of the crystalline Archean rocks, as well as the limestones and shales of the region between here and the St. Lawrence.

Following the southward drifting of the material by the ice came the reversal and northward drifting of the finer material borne by streams pouring into lake Warren, then later into lake Iroquois, and now into the still lower lake Ontario. The Warren silts occur upon the till over the area south of the "Ridge Road" and below 900 feet altitude. The Iroquois silts occupy the surface between the present lake Ontario and the beach altitude of 435–440 feet. This work of stream and lake has thus helped to unify the flora of the region.

The chief differentiation of the flora produced by differences in the geological characters of the surface will be found upon tracts that are washed sands or silts, such as the Chili sand knolls and the Pittsford or the Mendon sand and gravel hills, and upon the tracts of limestone above mentioned.

The topographic relief of the surface is insufficient to greatly affect the flora.

CLIMATIC CONDITIONS.

Statistics of Climate at Rochester.

CONTRIBUTED BY MR. ORIN PARKER, WEATHER OBSERVER.

The following statistics cover a period of twenty-five years, from January 1, 1871, to January 1, 1896, and are obtained from the accurate records of the Rochester Station of the United States Weather Bureau.

TEMPERATURE. (DEGREES FAHRENHEIT.)

Highest recorded temperature.....	99 (July 20, 1894).
Lowest " "	—12 (Jan. 30, 1873, and Feb. 9, 1875.)
Average variation between day and night	16

Highest annual temperature.....	50 (1881)
Lowest " "	44 (1872)
Average " "	47

	Spring.	Summer.	Autumn.	Winter.
Highest seasonal temperature..	49 (1878)	71 (1876)	55 (1881)	34 (1889–90)
Lowest " " ..	39 (1883)	66 (1889)	45 (1873)	20 (1874–75)
Average " " ..	43	68	50	26

	Jan.	Feb.	Mar.	April.	May.	June.
Highest monthly temp...	36 ('80)	33 ('82)	40 ('94)	53 ('70)	63 ('80)	71 ('95)
Lowest " " ..	17 ('93)	14 ('85)	21 ('85)	36 ('74)	50 ('82)	61 ('81)
Average " " ..	25	24	30	44	56	66

	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Highest monthly temp...	75 ('87)	72 ('81)	72 ('81)	58 ('79)	42 ('85)	37 ('89)
Lowest " " ..	65 ('84)	64 ('85)	56 ('71)	43 ('87)	27 ('73)	20 ('76)
Average " " ..	70	68	62	50	38	28

PRECIPITATION—RAINFALL, INCLUDING MELTED SNOW, (IN INCHES).

Highest annual	53.86 (1874)
Lowest "	16.93 (1888)
Average "	34.99

	Spring.	Summer.	Autumn.	Winter.
Highest seasonal...	15.25 (1873)	14.14 (1871)	14.88 (1873)	14.64 (1877)
Lowest " ...	4.62 (1889)	5.00 (1887)	3.01 (1887)	3.40 (1874)
Average " ...	8.68	9.25	8.31	8.72

	Jan.	Feb.	Mar.	April.	May.	June.
Highest monthly	8.05 ('77)	5.40 ('75)	7.02 ('73)	4.99 ('74)	6.87 ('94)	6.68 ('92)
Lowest "	0.94 ('82)	0.46 ('76)	0.94 ('89)	0.94 ('84)	1.12 ('91)	0.94 ('93)
Average "	3.19	2.71	2.86	2.48	3.34	3.22

	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Highest monthly	5.44 ('73)	7.26 ('86)	5.69 ('76)	8.67 ('73)	5.46 ('77)	6.17 ('78)
Lowest "	1.07 ('86)	0.70 ('94)	0.51 ('71)	0.62 ('82)	0.80 ('87)	1.00 ('74)
Average "	2.96	3.07	2.38	2.98	2.99	2.86

RELATIVE HUMIDITY. (PERCENTAGE.)

Highest yearly	80 (1885)
Lowest "	70 (1895
Average "	74

	Jan.	Feb.	Mar.	April.	May.	June.
Highest monthly	88 ('88)	84 ('89)	83 ('88)	76 ('86)	76 ('85)	77 ('85)
Lowest "	73 ('72)	71 ('77)	72 ('95)	60 ('72)	54 ('79)	61 ('73)
Average "	80	79	77	68	66	69

	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Highest monthly	79 ('85)	82 ('85)	81 ('90)	86 ('85)	83 ('85)	85 ('85)
Lowest "	62 ('88)	61 ('76)	66 ('75)	67 ('79)	70 ('83	72 ('91)
Average "	69	71	73	75	77	84

CLOUDINESS. (PERCENTAGE.)

	Jan.	Feb.	Mar.	Apr.	May.	Jun.	July.	Aug.	Sep.	Oct.	Nov.	Dec.
Average	78	71	67	55	54	46	46	47	49	61	77	81

WINDS.

Direction—west and south-west prevailing.

Velocity—

Highest hourly, in miles	78	(March 31, 1882.)
Highest monthly, in miles	11,714	(January, 1884.)
Lowest " "	3,766	(August, 1888.)
Average " "	6,972	
Highest yearly, "	98,799	(1884.)
Lowest " "	71,294	(1894.)
Average " "	83,764	

Date of Earliest Blossoming of Trees.

CONTRIBUTED BY DR. C. M. BOOTH.

Date.	Maple. Acer dasycarpum.	Cherry. May Bigarreau.	Apple. Early Harvest.
1871	March 10	April 20	May 16
1872	April 10	May 7	
1873	" 10	" 16	" 25
1874	March 19	" 12	" 24
1875	April 3	" 12	
1876	March 11	" 7	" 24
1877	April 2	" 8	" 19
1878	March 8	April 19	April 28
1879	April 10	May 5	May 17
1880	March 2	April 29	" 9
1881	April 13	May 3	" 12
1882	March 2	" 4	Red Astrachan.
1883	April 11	" 8	May 20
1884	March 28	" 5	" 19
1885	April 20	" 13	" 12
1886	March 31	April 23	" 6
1887	April 9	May 4	" 14
1888	" 9	" 8	" 26
1889	" 7	" 3	" 9
1890	" 5	April 26	" 20
1891	March 28	" 20	" 10
1892	April 2	May 4	" 20
1893	April 10	" 12	" 20
1894	March 10	April 21	" 6
Average	March 29-30	May 4-5	May 16-17

THE CATALOGUE.

EXPLANATION OF THE PLAN.

Authorities.—In arrangement and nomenclature this list of plants follows, as its standard of authority, the sixth edition of Gray's *Manual of Botany.** The only exception in the general arrangement is the placing of the Gymnosperms after the Monocotyledons. Four names from the fifth edition of Gray's Mauual have been retained for the purpose of making comparison (see pages 19–27) between this flora and the Cayuga and the Buffalo floras; these are as follows:

Viola pubescens var. eriocarpa,
Potentilla Canadensis var. simplex,
Cratægus tomentosa var. pyrifolia,
Polygonum dumetorum.

The following names, mainly of introduced plants, do not occur in the Manual, but those designated by an asterisk (*) may be found in Gray's *Field, Forest and Garden Botany.*

Ranunculus acris, double-flowered,
*Brassica Rapa,
*Lychnis Chalcedonica,
*Lychnis coronaria,
*Althæa rosea,
*Tilia Europæa,
*Trifolium incarnatum,
*Colutea arborescens,
*Prunus Persica,
*Prunus domestica,
*Pyrus Aucuparia,
*Ribes rubrum,
*Ribes nigrum,
*Coriandrum sativum,
Sanicula gregaria,
Sanicula trifoliata,
Aster puniceus, smooth stems, pink fls.
Rudbeckia hirta—form with brown bands at base of rays,
Chrysanthemum Leucanthemum var. tubuliflorum,
*Calendula officinalis,
Cnicus arvensis var. albiflorus,
Silybum Marianum,
*Lactuca sativa,
*Physalis Alkekengi,
*Atropa Belladonna,
*Veronica spicata,
Digitalis lanata,
*Thymus vulgaris,
*Stachys lanata,
*Quercus Robur var. pedunculata,
*Castanea sativa,
*Fagus sylvatica,
*Salix Caprea,
Juncus tenuis, tall, heads crowded
Typha latifolia var. elongata,
Carex gracillima × C. arctata,
Carex interior,
Carex sterilis excelsior,
Panicum Crus-galli var. muticum,
Avena sativa,
Cynosurus cristatus,
Juniperus Virginiana var. prostrata.

In order to make this list accord with the "new nomenclature",*

*While recognizing the claims of the "New Nomenclature", the Committee desire to make this paper immediately useful in the schools of western New York, and so feel compelled to adapt it to the only text-book in botany now in general use. However, by including, in brackets, the names of the new system wherever they are different, it is hoped to make the publication up to date in botanical science and yet at once available to all students in botany.

as given in "*List of Pteridophyta and Spermatophyta growing without cultivation in Northeastern North America*", wherever the names of our plants as given in that publication are different from the names used in Gray's Manual the new nomenclature names are also given, in brackets. When only the author's name is changed, that also is given in brackets. In other words, all bracketed matter is upon the authority of the new nomenclature.

In all cases where the catalogue name is different from the name of the same plant in the fifth edition of the Manual, the latter name is inserted, immediately following, in parenthesis. All special references to the Manual are to the fifth edition.

All ordinal and generic names and synonyms will appear in the index.

In the list of plants the names are included of a few which are not regarded as fully established, but such plants are not given a number. (See page 12.)

In the cases of "rare" or "scarce" plants the localities are given and the names of the collectors. In a few instances no locality is given, on account of the absence of such record in the list of the collector, who is deceased or inaccessible. The other descriptive terms and comments are self-explanatory.

Typography and reference marks.—Each species, variety, or marked form regarded as an established member of our flora is given a catalogue number. Those without numbers are not fully established.

Heavy-faced type indicates species believed to be indigenous. Names of introduced species are printed in small capitals, as are also the popular names.

Parentheses following catalogue names enclose the names used in Gray's fifth edition, as stated above.

Brackets indicate that the enclosed matter is the designation given in the "new nomenclature", as explained above.

Parentheses, within the brackets, are used in the "new nomenclature" to cite the original authority for a species which has been transferred from one genus to another. The name following is that of the author of the new binomial.

The name of the discoverer of a plant new to our district, or a new station of a rare or scarce plant, is given in italics. An exclamation point after a name indicates that the compilers have verified the discovery.

PHÆNOGAMIA. [*SPERMATOPHYTA.*]

DICOTYLEDONES.

RANUNCULACEÆ.

1. CLEMATIS L.

1. **C. Virginiana** L. COMMON VIRGIN'S BOWER.
Banks of streams, thickets and swamps; common.

2. ANEMONE Tourn. [L.]

2. **A. cylindrica** Gray. LONG-FRUITED ANEMONE.
Sandy woods; scarce. Irondequoit. Penfield, *L. Holzer.*

3. **A. Virginiana** L.
Dry banks of streams, hills, meadows; common.

4. **A. Pennsylvanica** L. [*A. Canadensis* L.]
Shores of lake Ontario and all our bays, borders of streams and ponds; common.

5. **A. nemorosa** L. [*A. quinquefolia* L.] WIND-FLOWER.
Copses and woods; rare. Bank of Irondequoit creek, Brighton, *Dr. C. M. Booth, Otto Betz, John Dunbar.* Kendall, Orleans county, *M. S. Baxter.*

6. **A. nemorosa** L. var. **quinquefolia** Gray. [*A. quinquefolia* L.]
Rare. Brighton.

3. HEPATICA Dill. [Scop.] LIVER-LEAF.

7. **H. triloba** Chaix. [*H. Hepatica* (L.) Karst.]
Dry woods and ravines; common.

8. **H. acutiloba** DC. [*H. acuta* (Pursh) Britton.]
Rich woods and ravines; common. Forms with five-lobed leaves are not uncommon.

4. ANEMONELLA Spach. [SYNDESMON Hoffmg.]

9. **A. thalictroides** Spach. (*Thalictrum anemonoides* Mx.) [*Syndesmon thalictroides* (L.) Hoffmg.] RUE-ANEMONE.
Frequent in rich woods around Irondequoit bay and along Irondequoit creek, and similar situations elsewhere.

5. THALICTRUM Tourn. [L.]

10. **T. dioicum** L. EARLY MEADOW RUE.
Rocky woods, banks of Genesee river and sides of ravines; frequent.

11. **T. polygamum** Muhl. (*T. Cornuti* Man., p. 39.) TALL MEADOW RUE.
Wet meadows, low grounds, and along rivulets; common.

6. RANUNCULUS Tourn. [L.]

12. **R. aquatilis** L. var. **trichophyllus** Gray. [*Batrachium trichophyllum* (Chaix) Bossch.] WHITE WATER CROWFOOT.
Frequent in shallow water and slow-flowing streams.

13. **R. multifidus** Pursh. [*R. delphinifolius* Torrey in Eaton.] YELLOW WATER CROWFOOT.
Ditches and shallow pools; scarce. Irondequoit. West Henrietta. Chili. Gates. Wayne county.

14. **R. Flammula** L. var. **intermedius** Hook. [*R. reptans intermedius* (Hook.) T. & G.] SMALLER SPEARWORT.
Rare. Long point, Sodus bay, *Plants of Oneida Co.*, pp. 3, 131.

15. **R. Flammula** L. var. **reptans** E. Meyer. [*R. reptans* L.] CREEPING SPEARWORT.
Rare. Sandy shore of lake Ontario at Sodus bay, *G. T. Fish.*

16. **R. abortivus** L. SMALL-FLOWERED CROWFOOT.
Damp woods and wet places; common.

17. **R. abortivus** L. var. **micranthus** Gray. [*R. micranthus* Nutt.] *Dr. A. H. Searing.*

18. **R. sceleratus** L. CURSED CROWFOOT.
Wet ditches, muddy ground; not common. Abundant in some places along the borders of Irondequoit bay.

19. **R. recurvatus** Poir. HOOKED CROWFOOT.
Wet woods and ravines; frequent.

20. **R. fascicularis** Muhl. EARLY CROWFOOT.
Dry or moist hillsides and banks of streams; frequent. More abundant in the eastern section of our district than in the western.

21. **R. septentrionalis** Poir. (*R. repens*, of Manual, mainly.)
Wet meadows, ditches and marshy places; frequent.

22. **R. repens** L. TRAILING CROWFOOT.
Rare. Wayne county, *E. L. Hankenson.*
A double-flowered form occurs in a wet place by the roadside in the village of Bergen, Genesee county. Whether a spontaneous development or an escape from cultivation is not known. *39th N. Y. Rep.*

23. **R. Pennsylvanicus** L. f. BRISTLY CROWFOOT.
Wet places; frequent.

24. R. ACRIS L. TALL BUTTERCUP.
Fields and roadsides; very common.

25. A form with 7–20 petals, growing with the type by a roadside in the town of Brighton, 1885, *J. B. Fuller*; Aug. 1895, *Miss F. Beckwith.* Apparently a spontaneous development; evidently not the cultivated double variety.

7. CALTHA L.

26. **C. palustris** L. MARSH MARIGOLD.
Swamps and wet meadows; common.

8. TROLLIUS L.

27. **T. laxus** Salisb. AMERICAN GLOBE-FLOWER.
Rare. Cold bog between Mt. Hope and Genesee River.

9. COPTIS Salisb.

28. **C. trifolia** Salisb. [*C. trifolia* (L.) Salisb.] THREE-LEAVED GOLDTHREAD.
Cold, moist woods and swamps; frequent.

10. AQUILEGIA Tourn. [L.]

29. **A. Canadensis** L. WILD COLUMBINE.
Rocky banks and ravine sides; also on sandy slopes; common.

— A. VULGARIS L. GARDEN COLUMBINE.
Waste place, Central avenue, Rochester, 1892–4.

DELPHINIUM Tourn. [L.]

— D. CONSOLIDA L. FIELD LARKSPUR.
Occasionally escapes. *G. T. Fish. Otto Betz.*

— D. AJACIS L. ROCKET LARKSPUR. Escaped to roadside, Greece.

11. CIMICIFUGA L.

30. **C. racemosa** Nutt. [*C. racemosa* (L.) Nutt.] BLACK SNAKEROOT. BLACK COHOSH.
Borders of woods and banks of streams; infrequent.

12. ACTÆA L.

31. **A. spicata** L. var. **rubra** Ait. [*A. rubra* (Ait.) Willd.] RED BANEBERRY. RED COHOSH.
Woods and wooded river banks and ravine sides; frequent.

32. **A. alba** Bigel. [*A. alba* (L.) Mill.] WHITE BANEBERRY. WHITE COHOSH.
River banks and woods; frequent.

13. HYDRASTIS Ellis. [L.]

33. **H. Canadensis** L. ORANGE-ROOT. GOLDEN SEAL.
Moist woods, wet meadows, ravines; scarce. Near Rochester, *Dr. C. M. Booth.* Greece, *Bradley.* Gates, *G. T. Fish.* Rush, *Miss Florence Beckwith.* Hamlin and Penfield, *M. S. Baxter.* Bergen, *Prof. W. H. Lennon.* Wayne county.

MAGNOLIACEÆ.

14. MAGNOLIA L.

34. **M. acuminata** L. CUCUMBER-TREE.
Woods, with *Liriodendron;* rare. Parma, Monroe county, and Fisher's Station, Ontario county, *M. S. Baxter.* Galen, Wayne county.

15. LIRIODENDRON L.

35. **L. Tulipifera** L. TULIP-TREE.
Rich woods, hillsides, river banks; infrequent.

ANONACEÆ.

16. ASIMINA Adans.

36. **A. triloba** Dunal. [*A. triloba* (L.) Dunal.] COMMON PAPAW.
Rich woods, banks of streams; rare. Greece, *Bradley.* Parma, *J. B. Fuller.* Brockport, *Prof. W. H. Lennon.* Adams Basin, *M. S. Baxter.*

MENISPERMACEÆ.

17. MENISPERMUM L.

37. **M. Canadense** L. MOONSEED.
Woods, thickets, rocky river banks; frequent.

BERBERIDACEÆ.

18. BERBERIS L.

38. B. VULGARIS L. COMMON BARBERRY.
Scarce. Naturalized along the banks of Genesee river and elsewhere.

19. CAULOPHYLLUM Michx.

39. **C. thalictroides** Michx. [*C. thalictroides* (L.) Michx.] PAPPOOSE-ROOT. BLUE COHOSH.
Woods and ravines, in rich soil; frequent.

20. JEFFERSONIA Barton.

40. **J. diphylla** Pers. [*J. diphylla* (L.) Pers.] TWIN-LEAF.
Rich soil along streams and in woods; rare. Brighton, *Dr. Booth!* Pittsford, *Rev. J. Walton.* Near Brockport, *Prof. Lennon.* Clarendon, Orleans county, *M. S. Baxter.* Wayne county, *E. L. Hankenson.*

21. PODOPHYLLUM L.

41. **P. peltatum** L. MAY-APPLE. MANDRAKE.
Rich woods, meadows, along streams; common.

NYMPHÆACEÆ.

22. BRASENIA Schreber.

42. **B. peltata** Pursh. [*B. purpurea* (Michx.) Casp.] WATER-SHIELD.
Ponds; rare. Bushnell's Basin, *M. S. Baxter.* Wayne county.

23. NELUMBO Tourn. [Adans.]

43. **N. lutea** Pers. [*N. lutea* (Willd.) Pers.] YELLOW NELUMBO, OR WATER CHINQUAPIN.
Rare. Near the head of Big Sodus bay, Wayne county.

24. NYMPHÆA Tourn. [CASTALIA Salisb.]

44. **N. odorata** Ait. [*Castalia odorata* (Dryand.) Woodv. & Wood, incl. var. *minor* Sims.] SWEET-SCENTED WATER-LILY.
Ponds; rare. Mendon ponds. Bushnell's Basin, *M. S. Baxter.* Wayne county, *E. L. Hankenson.*

45. **N. odorata** Ait. var **minor** Sims.
Same stations as the preceding, in shallower water or mud along the margins of the ponds.

46. **N. reniformis** DC. (*N. tuberosa* Paine.) [*Castalia tuberosa* (Paine) Greene.] TUBER-BEARING WATER-LILY.
Abundant in all our bays and ponds connecting with lake Ontario, and in the marshes at the mouth of Genesee river.

25. NUPHAR Smith. [NYMPHÆA L.]

47. **N. advena** Ait. f. [*Nymphæa advena* Soland.] YELLOW POND-LILY.
Ponds, slow-flowing streams, ditches; common.

48. **N. advena** Ait. f. var. **minus** Morong. (*N. luteum* Manual, not Smith.) [*Nymphæa rubrodisca* (Morong) Greene.] Rare. Wayne county.

49. **N. Kalmianum** Ait. (*N. luteum* var. *pumilum* Man.) [*Nymphæa microphylla* Pers.] Rare. Sodus Bay, *G. T. Fish.*

SARRACENIACEÆ.

26. SARRACENIA Tourn. [L.]

50. **S. purpurea** L. SIDE-SADDLE FLOWER. PITCHER-PLANT.
Frequent in the bogs at Mendon and Bergen. Wayne county.

PAPAVERACEÆ.

27. SANGUINARIA Dill. [L.]

51. **S. Canadensis** L. BLOOD-ROOT.
Open woods, thickets, sides of ravines; common.

28. CHELIDONIUM L.

52. C. MAJUS L. CELANDINE.
Streets, waysides and waste places; frequent.

PAPAVER Tourn. [L.]

— P. SOMNIFERUM L. COMMON POPPY.
Escape. Roadside, *G. T. Fish.* Adams Basin, *M. S. Baxter.*

FUMARIACEÆ.

29. ADLUMIA Raf.

53. **A. cirrhosa** Raf. [*A. fungosa* (Ait.) Greene.] ALLEGHANY VINE.
Rich woods; rare. Greece and Parma, *Bradley.* Lake woods, Hamlin, *Prof. W. H. Lennon.*

30. DICENTRA Borkh. [BICUCULLA Adans.]

54. **D. Cucullaria** DC. [*Bicuculla Cucullaria* (L.) Millsp.] DUTCHMAN'S BREECHES.
Moist rich woods and ravines; common.

55. **D. Canadensis** DC. [*Bicuculla Canadensis* (Goldie) Millsp.] SQUIRREL CORN.
Rich woods, ravine sides; common.

31. CORYDALIS Vent. [CAPNOIDES Adans.]

56. **C. glauca** Pursh. [*Capnoides sempervirens* (L.) Borck.] PALE CORYDALIS.
Rare. *Prof. W. H. Lennon. Frederick Starr.*

57. **C. flavula** DC. [*Capnoides flavulum* (Raf.) Kuntze.]
Rare. Lime Rock, Genesee county, *Miss Florence Beckwith.*

CRUCIFERÆ.

32. DENTARIA Tourn. [L.]

58. **D. diphylla** L. [Michx.] PEPPER-ROOT.
Rich woods and ravines; common.

59. **D. laciniata** Muhl. CUT-LEAVED PEPPER-ROOT.
Rich woods and ravines: common.

33. CARDAMINE Tourn. [L.]

60. **C. rhomboidea** DC. [*C. bulbosa* (Schreb.) B. S. P.] SPRING CRESS.
Woods, wet meadows and springy places; common.

61. **C. rhomboidea** DC. var. **purpurea** Torr. [*C. Douglassi* (Torr.) Britton.] PURPLE FLOWERED SPRING CRESS.
Low grounds along rivulets, wet places; common.

62. **C. pratensis** L. CUCKOO-FLOWER.
Wet meadows and bogs; scarce. Near Rochester, *Dr. C. M. Booth.* West Henrietta, *J. B. Fuller.* Penfield and Bergen, *M. S. Baxter.* Wayne county, *E. L. Hankenson.*

63. **C. hirsuta** L. SMALL BITTER CRESS.
Wet places; common.

34. ARABIS L.

64. **A. hirsuta** Scop. [*A. hirsuta* (L.) Scop.] ROCK CRESS.
Rare. Rocky bank of Genesee river below lower falls.

65. **A. lævigata** Poir. [*A. lævigata* (Muhl.) Poir.] ROCK CRESS.
Rocky places; frequent.

66. **A. Canadensis** L. SICKLE-POD.
River banks and ravines; not common.

67. **A. perfoliata** Lam. [*A. glabra* L.] TOWER MUSTARD.
Rare. Brockport, *M. S. Baxter. Dr. Searing.* Wayne county.

35. ALYSSUM Tourn. [L.]

68. A. CALYCINUM L. [*Alyssum alyssoides* (L.) Gouan.]
Rare. Roadside, Culver park, Rochester, with *Crepis tectorum, J. B. Fuller.* Scottsville, *Miss Florence Beckwith.* Wayne county.

36. CAMELINA Crantz.

69. C. SATIVA Crantz. [*C. sativa* (L.) Crantz.] FALSE FLAX.
Occasional in fields and waste places. Abundant in wheat fields near Bergen, Genesee county, *39th N. Y. Rep.* Wayne county.

37. NASTURTIUM R. Br. [RORIPA Scop.]

70. N. OFFICINALE R. Br. *Roripa Nasturtium* (L.) Rusby.] TRUE WATER CRESS. Cold streams, ditches, springy places; abundant.

71. N. SYLVESTRE R. Br. [*Roripa sylvestris* (L.) Bess.] YELLOW CRESS.
Flats along Genesee river: below the upper landing; abundant near the mouth of Red creek; in the town of Henrietta and near Scottsville, *Miss Florence Beckwith.*

72. **N. palustre** DC. [*Roripa palustris* (L.) Bess.] MARSH CRESS.
Muddy shores, ditches, wet places; common.

73. **N. palustre** DC. var. **hispidum** Gray. [*Roripa hispida* (Desv.) Britton.]
Rare. Long Pond, *Dr. Anna H. Searing.* Wayne county.

74. **N. lacustre** Gray. [*Roripa Americana* (A. Gray) Britton.] LAKE CRESS.
Common in bays and inlets along the shore of lake Ontario. Black creek, near Bergen, *40th N. Y. Rep.*

75. N. ARMORACIA Fries. [*Roripa Armoracia* (L.) A. S. Hitchcock]. HORSE-RADISH. Wet places, ditches, waste places; common.

38. BARBAREA R. Br.

76. **B. vulgaris** R. Br. [*B. Barbarea* (L.) McM.] COMMON WINTER CRESS. YELLOW ROCKET.
Wet grounds, ditches, roadsides; common.

77. B. PRÆCOX R. Br. [*B. præcox* (J. E. Smith) R. Br.] EARLY WINTER CRESS. Rare. Opposite the grove on Lake avenue, Rochester, *L. Holzer*. Brockport, *Prof. W. H. Lennon*.

39. HESPERIS Tourn. [L.]

78. H. MATRONALIS L. DAME'S VIOLET.
Rare. Bank of Allen's creek, Penfield, *Rev. J. Walton*.

40. ERYSIMUM Tourn. [L.]

79. **E. cheiranthoides** L. WORM-SEED MUSTARD.
Dry or moist soil; infrequent; most abundant in dry sandy land. Roadsides, north Goodman and Prince streets, Rochester. Sandy fields near Irondequoit bay, Penfield. Gates, *G. T. Fish*.

41. SISYMBRIUM Tourn. [L.]

80. S. OFFICINALE Scop. [*S. officinale*, (L.) Scop.] HEDGE MUSTARD.
Waste places and roadsides; very common.

81. S. THALIANA Gaud. [*Stenophragma Thaliana* (L.) Celak.] MOUSE-EAR CRESS.
Dry sterile soil; rare. Rochester, *Dr. C. M. Booth*. Wayne county.

42. BRASSICA Tourn. [L.]

82. B. SINAPISTRUM Boiss. YELLOW MUSTARD. ENGLISH CHARLOCK.
Fields, roadsides, waste places; common.

— B. ALBA Boiss. [*Sinapis alba* L.] WHITE MUSTARD. Escapes rarely.

83. B. NIGRA Koch. [*B. nigra* (L.) Koch.] BLACK MUSTARD.
Cultivated fields, waste places, along streams; common.

— B. CAMPESTRIS L. RUTA-BAGA. Occasionally spontaneous.

— B. RAPA L. TURNIP. Occasionally spontaneous.

43. CAPSELLA Medic. [BURSA Weber.]

84. C. BURSA-PASTORIS Mœnch. [*Bursa Bursa-Pastoris* (L.) Weber.] SHEPHERD'S PURSE. Everywhere abundant.

44. THLASPI Tourn. [L.]

85. T. ARVENSE L. FIELD PENNY-CRESS. MITHRIDATE MUSTARD.
Rare. Roadside, Bergen, Genesee county, *G. T. Fish*.

45. LEPIDIUM Tourn. [L.]

86. **L. Virginicum** L. WILD PEPPER-GRASS.
Roadsides and waste grounds; common.

87. **L. intermedium** Gray.
Equally common with the preceding, which it resembles closely.

88. L. RUDERALE L
Rare. Rochester, *H. C. Maine.*

89. L. CAMPESTRE Br. [*L. campestre* (L.) R. Br.]
Not common. First observed in the vicinity of Rochester in 1862, on Charlotte railroad track, Greece, a single plant, *J. B. Fuller.* Abundant in grain fields, Riga, 1891, *Miss F. Beckwith.* Mendon, *M. S. Baxter.* Wayne county, *E. L. Hankenson.*

46. CAKILE Tourn. [Gærtn.]

90. **C. Americana** Nutt. [*C. edentula* (Bigel.) Hook.] AMERICAN SEA-ROCKET.
Frequent along the shore of lake Ontario.

RAPHANUS Tourn. [L.]

— R. SATIVUS L. GARDEN RADISH. Occasionally escapes to roadsides.

CAPPARIDACEÆ.

47. POLANISIA Raf.

91. **P. graveolens** Raf.
Lake shores; rare. Shore lake Ontario: at Charlotte, *C. M. Booth*, mouth of Sandy creek, Monroe county, *M. S. Baxter;* Wayne county, *E. L. Hankenson.* Shores of Canandaigua lake, *Miss M. E. Macauley.*

CISTACEÆ.

48. HELIANTHEMUM Tourn. [Pers.]

92. **H. Canadense** Michx. [*H. Canadense* (L.) Michx.] FROST-WEED.
Dry sandy banks and fields; scarce. Irondequoit, *C. M. Booth.* Shore of Irondequoit bay, *Miss M. E. Macauley.* Greece, *J. B. Fuller.* Bank Genesee river, *G. T. Fish, Dr. Searing.* Penfield, *L. Holzer.* Wayne Co.

49. LECHEA Kalm. [L.]

93. **L. major** Michx. [*L. villosa* Ell.] PINWEED.
Rare. Penfield, *L. Holzer.* Avon, *Sartwell in Herb. Ham Coll.*

94. **L. minor** L. [*L. intermedia* Leggett.] SMALLER PINWEED.
Rare. Irondequoit, *Dr. Anna H. Searing.*

VIOLACEÆ.

50. VIOLA Tourn. [L.]

95. **V. palmata** L. (*V. cucullata* var. *palmata* Gray.) HAND-LEAVED VIOLET.
Dry wooded slopes and hillsides, especially around Irondequoit bay and along the creek; not common.

96. **V. palmata** L. var. **cucullata** Gray. (*V. palmata* Ait.) [*V. obliqua* Hill.] COMMON BLUE VIOLET.
Woods, open thickets, meadows, swamps, waysides; very common.
A peculiar form in Bergen swamp. Leaves very small, about half an inch broad; peduncles elongated; lateral petals whitish at base. *39th N. Y. Rep.*
A form in a swamp in Gates. Corolla pale blue, striped with white; retains its character under cultivation. *Miss Florence Beckwith.*

97. **V. sagittata** Ait. ARROW-LEAVED VIOLET.
Dry sandy grass lands; frequent in the eastern part of our district, but has not been observed west of Rochester by any of our collectors.

98. V. ODORATA L. SWEET VIOLET. ENGLISH VIOLET.
Escaped from gardens in various places about Rochester. Wayne Co.

99. **V. blanda** Willd. SWEET WHITE VIOLET.
Everywhere common in wet places.

100. **V. blanda** Willd. var. **renifolia** Gray. [*V. blanda renifolia* A. Gray.]
Rare. Bergen swamp, *J. B. Fuller*. Riga, *Miss Florence Beckwith*.

101. **V. rotundifolia** Michx. ROUND-LEAVED VIOLET.
Cold rich woods; rare. Brighton, *J. B. Fuller*. Webster, *M. S. Baxter*. Bergen swamp, Genesee county. Wayne county.

102. **V. pubescens** Ait. DOWNY YELLOW VIOLET.
Woods, ravines, river banks; common.

103. **V. pubescens** Ait. var. **eriocarpa** Nutt. WOOLLY-FRUITED VIOLET.
Common.

104. **V. Canadensis** L. CANADIAN VIOLET.
Rich moist woods and ravines; abundant in some places.

105. **V. striata** Ait. PALE VIOLET.
Rare. Wayne county, *E. L. Hankenson*.

106. **V. rostrata** Pursh. LONG-SPURRED VIOLET.
Woods and ravines; common.

107. **V. canina** L. var. **Muhlenbergii** Gray. (*V. canina* var. *sylvestris* Regel.) [*V. Labradorica* Schrank.] DOG VIOLET.
Damp woods, ravines and marshes; common.

— V. TRICOLOR L. PANSY. Occasionally escapes; not permanent.

108. V. TRICOLOR L. var. ARVENSIS Ging. [*V. tenella* Muhl.]
Rare. In a field near Mendon ponds, *M. S. Baxter*.

51. SOLEA Spreng.

109. **S. concolor** Ging. [*S. concolor* (Forst.) Ging.] GREEN VIOLET.
Rare. Gates, *G. T. Fish!* Dugway, *Mrs. Mary E. Strecter*. Wayne county, *E. L. Hankenson*.

CARYOPHYLLACEÆ.

52. DIANTHUS L.

110. D. ARMERIA L. DEPTFORD PINK.
Rare. Penfield, *Dr. C. M. Booth!* Gates, *G. T. Fish*.

53. SAPONARIA L.

111. S. OFFICINALIS L. BOUNCING BET. COMMON SOAPWORT.
Waysides and waste places; frequent.

112. S. VACCARIA L. (*Vaccaria vulgaris* Host.) COW-HERB.
Scarce. Rochester, *Dr. C. M. Booth*. Along West Shore railroad, near Genesee Junction, *Miss Florence Beckwith*. Vick farm, Greece, *J. B. Fuller*. Along N.Y.C. railroad, *G. T. Fish*. Wayne county.

54. SILENE L.

113. S. CUCUBALUS Wibel. (*S. inflata* Smith.) [*S. vulgaris* (Mœnch) Garcke.] BLADDER CAMPION.
Rare. Roadside, east end Culver park, Rochester, *J. B. Fuller.*

114. **S. Virginica** L. FIRE PINK.
Rare. *L. Holzer. Prof. W. H. Lennon.*

115. **S. antirrhina** L. SLEEPY CATCHFLY.
Rare. Brighton, *Dr. C. M. Booth!* Irondequoit, *J. B. Fuller.* Penfield, *L. Holzer.*

116. S. ARMERIA L. SWEET-WILLIAM CATCHFLY.
Escape. Mount Hope. Rochester, *Otto Betz.* Wayne county.

117. S. NOCTIFLORA L. NIGHT-FLOWERING CATCHFLY.
Cultivated grounds and waste places; frequent.

55. LYCHNIS Tourn. [L.]

— L. CHALCEDONICA L. SCARLET LYCHNIS. Escaped to roadside.

118. L. GITHAGO Lam. [*Agrostemma Githago* L.] CORN COCKLE.
Grain fields; frequent.

119. L. CORONARIA Lam. [*L. coronaria* (L.) Desv.] MULLEIN PINK.
Fields and roadsides; infrequent. Well established on the bank of a small stream in Greece.

56. ARENARIA L.

120. A. SERPYLLIFOLIA L. THYME-LEAVED SANDWORT.
Fields, sandy waste places, barren soil; abundant.

121. **A. Michauxii** Hook. f. (*A. stricta* Michx.) [*A. stricta* Michx.]
Rare. Dry bank, Irondequoit bay, Webster. Woods, Penfield, *Holzer.*

122. **A. lateriflora** L.
Marshes; rare. Irondequoit, *Dr. Booth.* Mendon, *G. T. Fish.*

57. STELLARIA L. [ALSINE L.]

123. S. MEDIA Smith. [*Alsine media* L.] COMMON CHICKWEED.
A very common weed in damp grounds.

124. **S. longifolia** Muhl. [*Alsine longifolia* (Muhl.) Britton.] LONG-LEAVED STITCHWORT.
Meadows and grassy places along streams; frequent.

125. S. GRAMINEA L. [*Alsine graminea* (L.) Britton.]
Rare. Irondequoit, *Dr. C. M. Booth.* Brighton, *Otto Betz.* Holley, Orleans county, *Prof. W. H. Lennon.*

126. **S. borealis** Bigel. [*Alsine borealis* (Bigel.) Britton.] NORTHERN STARWORT. Moist soil; scarce? Dr. C. M. Booth, who alone reports it in Monroe county, says it is frequent in Irondequoit. Wayne county.

58. CERASTIUM L.

127. C. VULGATUM L. (*C. viscosum* Man.) MOUSE-EAR CHICKWEED.
Fields, copses, waste places and roadsides; common.

128. **C. arvense** L. FIELD CHICKWEED.
Abundant in a sandy field on the Whitney farm in Greece.

59. BUDA Adans.

129. B. RUBRA Dumort. (*Spergularia rubra* Presl. var. *campestris* Gray.) [*Tissa rubra* (L.) Britton.] SAND-SPURRY.
A weed in cultivated ground, Irondequoit, *Dr. C. M. Booth!* Rare.

60. SPERGULARIA L.

130. S. ARVENSIS L. CORN-SPURRY.
Infrequent. *Dr. Booth. L. Holzer.* Caledonia, *Miss F. Beckwith.*

PORTULACACEÆ.

61. PORTULACA Tourn. [L.]

131. P. OLERACEA L. COMMON PURSLANE.
Cultivated grounds, roadsides, waste places; common.

62. CLAYTONIA Gronov. [L.]

132. **C. Virginica** L. NARROW-LEAVED SPRING-BEAUTY.
Moist open woods; common.

133. **C. Caroliniana** Michx. BROAD-LEAVED SPRING-BEAUTY.
Usually on higher ground and less common than the preceding.

HYPERICACEÆ.

63. HYPERICUM Tourn. [L.]

134. **H. Ascyron** L. (*H. pyramidatum* Ait.) GREAT ST. JOHN'S-WORT.
Banks of streams; scarce. Near upper falls, Rochester, and Irondequoit creek, Brighton, *Dr. C. M. Booth.* River road, near Mt. Hope, and town of Brighton, *Mrs. J. H. McGuire.* Penfield, near Irondequoit bay, *Miss E. E. Iles.* Mendon ponds, *G. T. Fish.*

135. **H. perforatum** L. COMMON ST. JOHN'S-WORT.
Fields, pastures, roadsides, waste places; very common.

136. **H. maculatum** Walt. (*H. corymbosum* Muhl.)
Frequent in damp places.

137. **H. mutilum** L. Low ground; frequent.

138. **H. Canadense** L. Sandy soil; frequent.

139. **H. Canadense** L. var. **majus** Gray. [*H. majus* (A. Gray) Britton.]
Wayne county, *E. L. Hankenson.*

64. ELODES Adans.

140. **E. campanulata** Pursh. (*E. Virginica* Nutt.) [*Hypericum Virginianum* L.] MARSH ST. JOHN'S-WORT.
Frequent in marshes.

MALVACEÆ.

— ALTHÆA ROSEA Cav., COMMON HOLLYHOCK, occasionally appears along roadsides.

65. MALVA L.

141. M. ROTUNDIFOLIA L. COMMON MALLOW.
Cultivated grounds, waysides, waste places; common.

142. M. SYLVESTRIS L. HIGH MALLOW. An occasional escape.

143. M. CRISPA L. [*M. verticillata crispa* L.] CURLED-LEAVED MALLOW. Escapes to roadsides. Henrietta, *Mrs. Mary E. Streeter*. Hamlin, *M. S. Baxter*.

144. M. MOSCHATA L. MUSK MALLOW. Frequent in fields and by roadsides. Abundant in places.

66. ABUTILON Tourn. [Gærtn.]

145. A. AVICENNÆ Gærtn. [*A. Abutilon* (L.) Rusby.] VELVET-LEAF. Waste places; occasional.

67. HIBISCUS L.

146. **H. Moscheutos** L. SWAMP ROSE-MALLOW. Swamps and marshes; scarce. Irondequoit bay, *Dr. Booth* and *G. T. Fish*. Long pond, *Dr. Searing!* Ogden. Bergen. Wayne county.

147. H. TRIONUM L. BLADDER KETMIA. FLOWER-OF-AN-HOUR. Occasional in neglected grounds.

TILIACEÆ.

68. TILIA Tourn. [L.]

148. **T. Americana** L. BASSWOOD. AMERICAN LINDEN. In rich woods and ravines and along river banks; common.

— T. EUROPÆA L. EUROPEAN LINDEN. Several specimens of var. *microphylla* in abandoned nursery grounds on Prince street, Rochester. Frequently planted for shade.

LINACEÆ.

69. LINUM Tourn. [L.]

149. **L. Virginianum** L. Scarce. Dry sandy woods, Irondequoit and Mendon.

150. L. USITATISSIMUM L. COMMON FLAX. Frequent along railroads.

GERANIACEÆ.

70. GERANIUM Tourn. [L.]

151. **G. maculatum** L. WILD CRANESBILL. Moist woods, meadows, river banks, ravines; common.

152. **G. Robertianum** L. HERB ROBERT. Moist woods and shaded river banks and ravines; common.

153. **G. Carolinianum** L. Rare. Pinnacle hill, *Miss Mary E. Macauley*. Adams Basin, *M. S. Baxter*.

154. G. PUSILLUM L. Rare. Corner Monroe avenue and Laburnum crescent, Rochester, *Miss F. Beckwith*. Neglected garden, Rochester, *Mrs. J. J. Kempe*. Gates, *G. T. Fish!* Sodus, Wayne county, 1885, *Miss Coleman in check list E. L. Hankenson*.

155. G. MOLLE L.
A form with purplish petals and smooth seeds is frequent in grass plots about the city of Rochester. First detected by *Miss Mary E. Macauley* in 1894.

ERODIUM L'Her.

— E. CICUTARIUM L'Her. [*E. cicutarium* (L.) L'Her.] STORK-BILL.
Roadside, East Rochester, *C. M. Booth*.

71. FLŒRKEA Willd.

156. **F. proserpinacoides** Willd. FALSE MERMAID.
Marshes and rich woods; scarce. Gates, *Dr. C. M. Booth*. Chili, *L. Holzer*. Adams Basin, *M. S. Baxter*. Near Fairport, *Miss Mary E. Macauley*. Bergen, Genesee county. Wayne county.

72. OXALIS L.

157. O. CORNICULATA L.
Rare. Roadside, Augusta street, near N. Y. C. railroad, Rochester, *J. B. Fuller*. The form with dark-colored leaves is frequent in cultivated ground near greenhouses.

158. **O. corniculata** L. var. **stricta** Sav. (*O. stricta* L.) [*O. stricta* L.] YELLOW WOOD-SORREL.
Woods, fields, roadsides and waste places; common.

73. IMPATIENS L.

159. **I. pallida** Nutt. [*I. aurea* Muhl.] PALE TOUCH-ME-NOT.
Moist shady places and along streams; infrequent.

160. **I. fulva** Nutt. [*I. biflora* Walt.] SPOTTED TOUCH-ME-NOT.
Wet shady woods, marshes, and along streams; abundant.

RUTACEÆ.

74. XANTHOXYLUM L.

161. **X. Americanum** Mill. NORTHERN PRICKLY ASH.
Swampy or low rich woods and along streams; occasionally on higher ground; infrequent.

75. PTELEA L.

162. **P. trifoliata** L. HOP-TREE.
Rare. Between the Genesee river and the Genesee Valley canal, Chili, *Dr. C. M. Booth* and *Geo. T. Fish*. Wayne county.

SIMARUBACEÆ.

76. AILANTHUS Desf.

163. A. GLANDULOSUS Desf. TREE-OF-HEAVEN.
Spontaneous in several places about Rochester; also at Riga, *Miss F. Beckwith;* Adams Basin, *M. S. Baxter*.

ILICINEÆ. [AQUIFOLIACEÆ.]

77. ILEX L.

164. **I. verticillata** Gray. [*I. verticillata* (L.) A. Gray.] BLACK ALDER.
Marshes and along streams; frequent. Abundant in the marshes along Irondequoit creek, Brighton, and at Mendon ponds.

78. NEMOPANTHES Raf. [ILICIOIDES Dumont.]

165. **N. fascicularis** Raf. (*N. Canadensis* DC.) [*Ilicioides mucronata* (L.) Britton.]
Margin of Irondequoit bay, Penfield. Frequent in the marshes about Mendon ponds. Adams Basin, *M. S. Baxter.* Wayne county.

CELASTRACEÆ.

79. CELASTRUS L.

166. **C. scandens** L. CLIMBING BITTER-SWEET.
River banks, along streams, and in thickets; frequent.

80. EUONYMUS Tourn. [L.]

167. **E. atropurpureus** Jacq. BURNING BUSH. WAAHOO.
Scarce. Indigenous in Seneca park, *G. T. Fish*, and Genesee Valley park, *C. C. Laney.* Greece, *Bradley.* Penfield, *Otto Betz.* Bank of Genesee river at Rush Junction, *C. C. Laney* and *John Dunbar.* Near Scottsville, *M. S. Baxter.* Wayne county.

— **E. Americanus** L. STRAWBERRY-BUSH.
Genesee river, *Sartwell in Herb. Ham. Coll.* Has not been observed by our collectors.

168. **E. Americanus** L. var. **obovatus** Torr. & Gray. [*E. obovatus* Nutt.]
Rare. North-east of Brockport, *Prof. Lennon.*

RHAMNACEÆ.

81. RHAMNUS Tourn. [L.]

169. **R. alnifolia** L'Her. ALDER-LEAVED BUCKTHORN.
Frequent in swamps and marshy places.

170. R. CATHARTICA L. COMMON BUCKTHORN.
Escapes from hedges occasionally.

82. CEANOTHUS L.

171. **C. Americanus** L. RED-ROOT. NEW JERSEY TEA.
Dry open woods along river banks and ravines; common.

VITACEÆ.

83. VITIS Tourn. [L.]

172. **V. æstivalis** Michx. SUMMER GRAPE.
Dry woods and thickets, along river banks and ravines; frequent.

173. **V. cordifolia** Michx. FROST GRAPE.
Wayne county, *E. L. Hankenson.*

174. **V. riparia** Michx. (*V. cordifolia* var. *riparia* Gray.) [*V. vulpina* L.] FROST GRAPE.
River banks and ravines; more common than *V. æstivalis.*

84. AMPELOPSIS Michx. [PARTHENOCISSUS Planch.]

175. **A. quinquefolia** Michaux. [*Parthenocissus quinquefolia* (L.) Planchon.] VIRGINIA CREEPER.
Moist woods, copses, river banks; common.

SAPINDACEÆ.

85. ACER Tourn. [L.]

176. **A. Pennsylvanicum** L. STRIPED MAPLE.
Rare. Seneca park, *C. C. Laney*. Webster, *M. S. Baxter*. Bank of Sodus bay and at Lake Bluff, *F. Williams in check list E. L. Hankenson*.

177. **A. spicatum** Lam. MOUNTAIN MAPLE.
Banks of Genesee river and ravine sides; frequent.

178. **A. saccharinum** Wang. [*A. Saccharum* Marsh.] SUGAR MAPLE.
Woods, river banks and ravines; one of the most common of our forest trees.

179. **A. saccharinum** Wang. var. **nigrum** Torr. & Gr. [*A. nigrum* Michx. f.] BLACK SUGAR MAPLE.
Not uncommon; frequently planted for street shade tree.

180. **A. dasycarpum** Ehrh. [*A. saccharinum* L.] WHITE OR SILVER MAPLE.
River banks and ravine sides, low woods and along streams; common.

181. **A. rubrum** L. RED OR SWAMP MAPLE.
Common in swamps and low woods; frequent on the banks of the Genesee river and in ravines.

86. NEGUNDO Mœnch.

182. **N. aceroides** Mœnch. [*Acer Negundo* L.] BOX-ELDER.
Rare. Bank of Genesee river, near Ballentine bridge, in the town of Chili, *M. S. Baxter* and *C. C. Laney*. Two large specimens, eighteen inches in diameter, in the town of Caledonia, Livingston county, a mile south of the N. Y. C. railroad bridge, *C. C. Laney* and *John Dunbar*.

87. STAPHYLEA L.

183. **S. trifolia** L. AMERICAN BLADDER NUT.
Copses, thickets; scarce. Chili, *Dr. Booth*. Riga, *Miss Beckwith*. Pittsford, *Dr. Searing*. Henrietta, *G. T. Fish*. Wayne county.

ANACARDIACEÆ.

88. RHUS L.

184. **R. typhina** L. [*R. hirta* (L.) Sudw.] STAGSHORN SUMAC.
Rocky river banks, ravines, hillsides; common.

185. **R. glabra** L. SMOOTH SUMAC.
In situations similar to the preceding, but less frequent.

186. **R. copallina** L. DWARF SUMAC.
Rare. Bushnell's basin, *M. S. Baxter*. *L. Holzer*. *Prof. Lennon*.

187. **R. venenata** DC. [*R. Vernix* L.] POISON SUMAC.
Swamps; frequent.

188. **R. Toxicodendron** L. [*R. radicans* L.] POISON IVY. POISON OAK.
Woods, banks of streams, waysides, fences; common.

189. **R. Canadensis** Marsh. (*R. aromatica* Ait.) [*R. aromatica* Ait.]
Rare. Bank of Genesee river, foot of Ambrose street, Rochester, *Fuller*. Canandaigua Lake, *Miss M. E. Macauley*. Wayne county.

POLYGALACEÆ.

89. POLYGALA Tourn. [L.]

190. **P. paucifolia** Willd.
Moist woods; not common. Chili and Riga, *Miss Florence Beckwith.* Bergen, Genesee county.

191. **P. polygama** Walt.
Sandy soil; rare. Penfield, *Dr. C. M. Booth.*

192. **P. Senega** L. SENECA SNAKE-ROOT.
Rocky soil, ravines, and in dry woods; not uncommon.

193. **P. Senega** L. var. **latifolia** Torr. & Gray. [*P. Senega latifolia* T. & G.]
Rare. Shore of lake Ontario, Irondequoit, *Dr. C. M. Booth.*

194. **P. sanguinea** L. [*P. viridescens* L.]
Rare. Greece, *Bradley.* Ontario, Wayne county, *Dr. Richards in check list E. L. Hankenson.*

195. **P. verticillata** L.
Banks and ravine sides, in dry soil; frequent.

LEGUMINOSÆ.

90. BAPTISIA Vent.

196. **B. tinctoria** R. Br. [*B. tinctoria* (L.) R. Br.] WILD INDIGO.
Dry open woods, usually in sandy soil; not common. Frequent on the banks of Genesee river and Irondequoit creek and bay.

197. **B. australis** R. Br. [*B. australis* (L.) R. Br.] BLUE FALSE INDIGO.
Near Canandaigua, *Prof. Eaton, Flora of the State of New York.*

91. LUPINUS Tourn. [L.]

198. **L. perennis** L. WILD LUPINE.
Common in sandy soil. A form with pink flowers occurs near the "sand cut" in Penfield.

92. TRIFOLIUM Tourn. [L.]

199. T. ARVENSE L. RABBIT-FOOT CLOVER.
Dry soil, in fields and by roadsides; infrequent.

200. T. PRATENSE L. RED CLOVER.
Common in fields, meadows, and by roadsides.

201. T. **reflexum** L. BUFFALO CLOVER.
Macedon, Wayne county, 1883, *E. L. Hankenson.*

202. T. REPENS L. WHITE CLOVER. Common everywhere.

203. T. HYBRIDUM L. ALSIKE CLOVER.
Fields, roadsides, waste places; common in the vicinity of Rochester.

— T. INCARNATUM L., CRIMSON CLOVER, was observed in 1860 in a vacant lot on South Union street.

204. T. AGRARIUM L. YELLOW OR HOP CLOVER.
Rare. Rochester, *Dr. Booth, Mrs. Mary E. Streeter.* Mount Hope, *Miss F. Beckwith.* Orleans county, *Miss Lucy Weld.* Wayne county.

205. T. PROCUMBENS L. LOW HOP CLOVER.
Fields and roadsides; rare. Irondequoit, *Dr. C. M. Booth*. Greece, *M. S. Baxter*. Penfield, *G. T. Fish*.

206. T. PROCUMBENS L. var. MINUS Gray. [*T. dubium* Sibth.]
Rare. Point Lookout, Irondequoit bay, *G. T. Fish*.

93. MELILOTUS Tourn. [Juss.]

207. M. OFFICINALIS Willd. [*M. officinalis* (L.) Lam.] YELLOW SWEET CLOVER.
Fields, roadsides and waste places; common.

208. M. ALBA Lam. WHITE SWEET CLOVER.
More widely distributed and abundant than the foregoing.

94. MEDICAGO Tourn. [L.]

209. M. SATIVA L. LUCERNE. ALFALFA.
Roadsides; frequent.

210. M. LUPULINA L. BLACK MEDICK.
Waysides, waste places, pastures, lawns; common.

95. AMORPHA L.

211. A. FRUTICOSA L. FALSE INDIGO.
Outcast from nursery grounds in Irondequoit. Well established near the head of the road to "float bridge", *Dr. C. M. Booth!*

96. TEPHROSIA Pers. [CRACCA L.]

212. **T. Virginiana** Pers. [*Cracca Virginiana* L.] GOAT'S RUE.
Dry sandy knolls and banks; scarce. Bank of Genesee river, *M. S. Baxter*. Brighton, *G. T. Fish*. Greece, *Bradley*. East side Irondequoit bay, *Dr. C. M. Booth!* Penfield, *L. Holzer*. Bushnell's Basin, *M. S. Baxter*.

97. ROBINIA L.

213. R. PSEUDACACIA L. COMMON LOCUST.
Spontaneous along the banks of Genesee river and elsewhere; not common.

214. R. VISCOSA Vent. CLAMMY LOCUST. Escape.

98. COLUTEA L.

215. C. ARBORESCENS L. COMMON BLADDER SENNA.
Escape. Well established by a roadside in the town of Brighton.

99. ASTRAGALUS Tourn. [L.]

216. **A. Canadensis** L. [*A. Carolinianus* L.]
Scarce. Banks of Genesee river. Long pond, *Dr. Anna H. Searing*. Wayne county.

217. **A. Cooperi** Gray. [*Phaca neglecta* Torr. & Gray.]
Rare. Bank of Genesee river, below lower falls.

100. CORONILLA L.

218. C. VARIA L. Macedon, Wayne county, *E. L. Hankenson*.

101. DESMODIUM Desv. [MEIBOMIA Adans.]

219. **D. nudiflorum** DC. [*Meibomia nudiflora* (L.) Kuntze.]
Dry open woods; frequent.
A form with white flowers occurs on the bank of Genesee river, near Hanford's Landing.

220. **D. acuminatum** DC. [*Meibomia grandiflora* (Walt.) Kuntze.]
Rich woods, river banks, ravines; common.

221. **D. pauciflorum** DC. [*Meibomia pauciflora* (Nutt.) Kuntze.]
Rare. Woods on the bank of Irondequoit bay, *Dr. Searing*.

222. **D. rotundifolium** DC. [*Meibomia rotundifolia* (Michx.) Kuntze.]
Dry woods, oak openings, copses, river banks; frequent.

223. **D. canescens** DC. [*Meibomia canescens* (L.) Kuntze.]
Rare. Orleans county, *Miss Lucy Weld*.

224. **D. cuspidatum** Torr. & Gray. [*Meibomia bracteosa* (Michx.) Kuntze.]
Dry woods and along streams; frequent.

225. **D. Dillenii** Darl. [*Meibomia Dillenii* (Darl.) Kuntze.]
Dry woods, banks, ravines; not common.

226. **D. paniculatum** DC. [*Meibomia paniculata* (L.) Kuntze.]
River banks, ravines, woods, thickets; frequent.

227. **D. Canadense** DC. [*Meibomia Canadensis* (L.) Kuntze.]
Woods and banks of streams; common.

228. **D. rigidum** DC. [*Meibomia rigida* (Ell.) Kuntze.]
Rev. J. E. Baker. Dr. Searing.

229. **D. ciliare** DC. [*Meibomia obtusa* (Muhl.) A. M. Vail.]
Rare. Bank of Allen's creek, *G. T. Fish*. Mendon, *M. S. Baxter*.

230. **D. Marilandicum** F. Boott. [*Meibomia Marylandica* (L.) Kuntze.]
Rare. Bank of Irondequoit bay, *Dr. C. M. Booth*. Wayne county.

102. LESPEDEZA Michx.

231. **L. violacea** Pers. (*L. violacea* var. *divergens* Man.) [*L. violacea* (L.) Pers.]
Dry banks, thickets, sandy woods; frequent.

232. **L. Stuvei** Nutt.
Dry banks; scarce. Along Genesee river and around Irondequoit bay.

233. **L. Stuvei** Nutt. var. **intermedia** Watson. (*L. violacea* var. *sessiliflora* Man., p. 137.) [*L. frutescens* (L.) Britton.]
Same range as the two preceding, but more abundant.

234. **L. polystachya** Michx. (*L. hirta* Ell.) [*L. hirta* (L.) Ell.]
Dry banks and woods; frequent.

235. **L. capitata** Michx.
Rare. Near Rochester, *L. Holzer*. Wayne county.

103. VICIA Tourn. [L.]

236. V. SATIVA L. COMMON VETCH.
Roadsides and borders of fields; scarce.

A form with acuminate, mucronate leaves, occurs along the railroad near Adams Basin, *M. S. Baxter;* and by the roadside, Brockport, *Prof. W. H. Lennon.*

237. **V. Cracca** L.
Rare. Roadside, East avenue, Rochester, near city line, *J. B. Fuller.* Fairport, near the railroad, *Miss Mary E. Macauley.*

238. **V. Caroliniana** Walt.
Ravines and banks, in dry or moist land; common.

239. **V. Americana** Muhl.
Moist soil on shady banks; not common.

104. LATHYRUS Tourn. [L.]

240. **L. maritimus** Bigelow. [*L. maritimus* (L.) Bigelow.] BEACH PEA.
Frequent along the sandy shore of lake Ontario.

241. **L. ochroleucus** Hook.
Frequent along the banks of the Genesee; plentiful in Seneca park.

242. **L. palustris** L.
Shores and borders of streams and marshes; frequent.

243. **L. palustris** L. var. **myrtifolius** Gray. [*L. myrtifolius* Muhl.]
Same range as the preceding, though less frequent.

105. APIOS Bœrhaave. [Mœnch.]

244. **A. tuberosa** Mœnch. [*A. Apios* (L.) MacM.] GROUND NUT.
Low grounds, along streams, borders of ponds and bays; common.

106. STROPHOSTYLES Ell. [PHASEOLUS L.]

245. **S. angulosus** Ell. (*Phaseolus diversifolius* Pers.) [*Phaseolus helvolus* L.]
Rare. Lake shore between Irondequoit bay and Charlotte, *G. T. Fish.* Wayne county, *E. L. Hankenson.* Oak Orchard creek, Orleans county, about two miles from lake Ontario, *M. S. Baxter.*

107. AMPHICARPÆA Ell. [FALCATA Gmel.]

246. **A. monoica** Nutt. [*Falcata comosa* (L.) Kuntze.] HOG PEANUT.
Woods, thickets, river banks, shores; common.

108. CASSIA Tourn. [L.]

247. **C. Marilandica** L. WILD SENNA.
Rare. Near Rochester, *Mrs. Mary E. Streeter.* Wayne county, *E. L. Hankenson.*

248. C. CHAMÆCRISTA L. PARTRIDGE PEA.
Introduced. Well established in uninclosed land on Grand avenue, Rochester, *Dr. C. M. Booth.* The station has been destroyed recently.

109. GLEDITSCHIA L.

249. G. TRIACANTHOS L. HONEY LOCUST.
Roadsides, near Rochester; seedlings from planted trees. Mendon, *G. T. Fish.* Orleans county, *Miss Lucy Weld.*

ROSACEÆ.

110. PRUNUS Tourn. [L.]

250. P. PERSICA L. [*Amygdalus Persica* L.] PEACH.
Roadsides and waste places; occasional.

251. **P. Americana** Marshall. WILD PLUM.
River banks, thickets, and borders of woods; frequent.

252. P. DOMESTICA L. GARDEN PLUM. Escaped; frequent.

253. P. AVIUM L. ENGLISH CHERRY.
Occasionally escapes to thickets and woods.

254. P. CERASUS L. SOUR CHERRY. Roadsides; infrequent.

255. **P. pumila** L. DWARF CHERRY.
Rare. Penfield, *Dr. C. M. Booth.*

256. **P. Pennsylvanica** L. f. WILD RED CHERRY.
Ravines and along the banks of the Genesee; frequent.

257. **P. Virginiana** L. CHOKE-CHERRY.
Rocky banks of Genesee river, ravines, thickets; common.

258. **P. serotina** Ehrh. WILD BLACK CHERRY.
Woods; widely distributed, but scarce.

111. SPIRÆA L.

259. **S. salicifolia** L. COMMON MEADOW-SWEET.
Borders of marshes; not common. Brighton, *Miss Mary E. Macauley.* Mendon ponds, *George T. Fish!* Long pond, *Dr. Searing.* Hamlin, *M. S. Baxter.* Wayne county.

260. S. TOMENTOSA L. HARDHACK.
Norton and St. Joseph streets, *L. Holzer.* Probably introduced.

112. PHYSOCARPUS Maxim. [OPULASTER Medic.]

261. P. OPULIFOLIUS Maxim. (*Spiræa opulifolia* L.) [*Opulaster opulifolius* (L.) Kuntze.] NINE-BARK. Known only as an escape.

113. RUBUS Tourn. [L.]

262. **R. odoratus** L. PURPLE FLOWERING RASPBERRY.
River banks and ravines; common.

263. **R. triflorus** Richardson. [*R. Americanus* (Pers.) Britton.] DWARF RASPBERRY.
Dry or moist woods; frequent.

264. **R. strigosus** Michx. WILD RED RASPBERRY.
Borders of woods and fields; abundant on clearings.

265. **R occidentalis** L. BLACK RASPBERRY.
Thickets, waysides, fences; common.

266. **R. villosus** Ait. COMMON HIGH BLACKBERRY.
Rocky river banks, borders of woods, thickets, clearings; common.

267. **R. Canadensis** L. DEWBERRY.
River banks, borders of woods, copses, fields; frequent.

268. **R. hispidus** L. SWAMP BLACKBERRY.
Low woods, wet grass lands, borders of swamps; frequent.

114. DALIBARDA L.

269. **D. repens** L.
Rare. Damp woods bordering Bergen swamp.

115. GEUM L.

270. **G. album** Gmelin. [*G. Canadense* Jacq.]
Damp woods and their borders; common. Occasionally by roadsides.

271. **G. Virginianum** L.
Low grounds and borders of woods; common.

272. **G. strictum** Ait.
Swamps, woods, low grass lands; common.

273. **G. rivale** L. PURPLE AVENS.
Marshes and wet meadows; frequent.

116. WALDSTEINIA Willd.

274. **W. fragarioides** Tratt. [*W. fragarioides* (Michx.) Tratt.] BARREN STRAWBERRY.
Dry woods, ravines, thickets; frequent.

117. FRAGARIA Tourn. [L.]

275. **F. Virginiana** Mill. [Duchesne.] WILD STRAWBERRY.
Woods, pastures, meadows; everywhere common.

276. **F. Virginiana** Mill. var. **Illinoensis** Gray. [Prince.]
River banks and in rich soil; frequent.

277. **F. vesca** L. WOOD STRAWBERRY.
River banks and woods; frequent.

118. POTENTILLA L.

278. **P. Norvegica** L. [*P. Monspeliensis* L.]
Roadsides, waste places, fields, pastures; common.

279. **P. supina** L. (*P. paradoxa* Nutt.) [*P. paradoxa* Nutt.]
Rare. Sandbar, Irondequoit bay, *G. T. Fish!* Shore of lake Ontario near Braddock's bay, *J. E. Paine!* Wayne county.

280. **P. Pennsylvanica** L.
Rare. Long pond, *Dr. Anna H. Searing.*

281. P. RECTA L.
Rare. Genesee Valley park, *Dr. C. M. Booth!* East Rochester, *Miss Mary E. Macauley.* Scottsville, *Miss Florence Beckwith.* Brockport, *Prof. W. H. Lennon.*

282. **P. argentea** L. SILVERY CINQUE-FOIL.
Dry fields and roadsides, in sandy or gravelly soil; common.

283. **P. palustris** Scop. [*Comarum palustre* L.] MARSH FIVE-FINGER.
Marshes; infrequent. Irondequoit bay, *Dr. C. M. Booth!* Round pond, *J. B. Fuller.* Mendon, *G. T. Fish!* Hamlin, *M. S. Baxter.*

284. **P. fruticosa** L. SHRUBBY CINQUE-FOIL.
Wet fields and borders of cold swamps; not common. Perinton, Mendon and Greece, Monroe county; Caledonia and Avon, Livingston county; Bergen, Genesee county; Wayne county.

285. **P. Anserina** L. SILVER WEED.
Frequent on the sandy shore of lake Ontario. Adams Basin.

286. **P. Canadensis** L. COMMON CINQUE-FOIL OR FIVE-FINGER.
Fields and roadsides, in dry soil; common.

287. **P. Canadensis** L. var. **simplex** Torr. & Gray.
Same range as the preceding; common.

119. AGRIMONIA Tourn. [L.]

288. **A. Eupatoria** Walt. [*A. striata* Michx.] AGRIMONY.
Borders of woods, ravines, fields, waysides; common.

120. POTERIUM L. [SANGUISORBA L.]

289. **P. Canadense** Benth. & Hook. [*Sanguisorba Canadensis* L.] CANADIAN BURNET.
Swamps; infrequent. Marsh at head of Irondequoit bay, Penfield, *Dr. C. M. Booth!* Brighton, *Otto Betz.* Two miles east of Pittsford, *Rev. J. Walton.* One mile west of Fairport, *Miss Mary E. Macauley.* Fisher's Station, *M. S. Baxter.*

121. ROSA Tourn. [L.]

290. **R. setigera** Michx. CLIMBING OR PRAIRIE ROSE.
Woods and river banks; rare. Culver's woods, East Rochester, *Dr. C. M. Booth, G. T. Fish.* Bank of Genesee river at upper falls, Rochester, woods in Brighton and in Irondequoit, *Dr. C. M. Booth.* Always in wild places and flowers always single. Wayne county.

291. **R. blanda** Ait. EARLY WILD ROSE.
Infrequent. Banks of Genesee river and shore of lake Ontario.

292. **R. Carolina** L. SWAMP ROSE.
Borders of swamps and low grounds; common.

293. **R. humilis** Marsh. DWARF ROSE.
Dry woods and rocky river banks. Our most common species.

294. **R. nitida** Willd.
Long pond, *Dr. Anna H. Searing. L. Holzer.*

295. R. RUBIGINOSA L. SWEET-BRIAR. EGLANTINE.
Roadsides; occasional.

122. PYRUS L.

296. P. MALUS L. APPLE. Frequent.

297. P. COMMUNIS L. PEAR. Occasional.

298. **P. coronaria** L. AMERICAN CRAB-APPLE.
Glades; frequent.

299. **P. arbutifolia** L. f. [*Aronia arbutifolia* (L.) Ell.] CHOKE-BERRY.
Infrequent. Adams Basin, *M. S. Baxter.* Bergen. Wayne county.

300. **P. arbutifolia** L.f. var. **melanocarpa** Hook. [*Aronia nigra* (Willd.) Britt.] Abundant in the marshes at Mendon ponds.

301. P. AMERICANA DC. [*Sorbus Americana* Marsh.] AMERICAN MOUNTAIN ASH. Escaped from cultivation.

302. P. AUCUPARIA Gærtn. EUROPEAN MOUNTAIN ASH. Several specimens in woods on the bank of Genesee river.

123. CRATÆGUS L.

303. C. OXYACANTHA L. ENGLISH HAWTHORN. Infrequent. Bank Genesee river, below lower falls. Gates. Adams Basin. Wayne county.

304. **C. coccinea** L. SCARLET THORN. Thickets and hillsides; frequent. Common along the banks of the Genesee river.

305. **C. tomentosa** L. BLACK THORN. Thickets along the river banks, old pastures, etc.; scarce.

306. **C. tomentosa** L. var. **pyrifolia** Gray. Same range as the preceding; scarce.

307. **C. punctata** Jacq. (*C. tomentosa* var. *punctata* Gray.) River banks and flats, fields, thickets, etc.; common. Occasionally with yellow fruit.

308. **C. Crus-galli** L. COCK-SPUR THORN. River banks and flats; rare. A fine specimen in Genesee Valley park. Wayne county, *E. L. Hankenson.*

124. AMELANCHIER Medic.

309. **A. Canadensis** Torr. & Gray. [*A. Canadensis* (L.) Medic.] SHAD-BUSH. River banks, ravines, thickets, woodlands; common.

310. **A. Canadensis** var. **rotundifolia** T. & G. [*A. rotundifolia* (Mx.) Rœm.] Plentiful on the banks of Genesee river and Irondequoit bay.

311. **A. Canadensis** var. (?) **oblongifolia** T. & G. [*A. Botryapium* (L. f.) D.C.] Ravines and low grounds.

SAXIFRAGACEÆ.

125. SAXIFRAGA L.

312. **S. Virginiensis** Michx. EARLY SAXIFRAGE. River banks, ravines, hillsides; abundant, except in the western part of our district.

313. **S. Pennsylvanica** L. SWAMP SAXIFRAGE. Cold swamps; infrequent. Irondequoit, *Dr. C. M. Booth!* Greece, *Miss Beckwith* and *Miss Macauley.* Adams Basin, *Prof. W. H. Lennon.* Fisher's Station, *M. S. Baxter.* Wayne county, *E. L. Hankenson.*

126. TIARELLA L.

314. **T. cordifolia** L. FALSE MITRE-WORT. Hilly woods, river banks and ravines; common.

127. MITELLA Tourn. [L.]

315. **M. diphylla** Tourn. [L.] MITRE-WORT. BISHOP'S CAP.
Rich woods, ravine sides, and shaded knolls; common.

316. **M. nuda** L.
Borders of swamps, in damp moss and deep shade; not common. Riga, *Miss Florence Beckwith*. Caledonia, Livingston county, *Miss Mary E. Roberts*. Bergen swamp, Genesee county. Wayne county.

128. CHRYSOSPLENIUM Tourn. [L.]

317. **C. Americanum** Schwein. GOLDEN SAXIFRAGE.
Cold wet places, in shade; frequent.

129. PARNASSIA Tourn. [L.]

318. **P. Caroliniana** Michx. GRASS OF PARNASSUS.
Wet cliffs, swamps, and along streams; infrequent. Genesee river, west bank, above paper-mill dam, *J. B. Fuller;* east bank, in Seneca park, *M. S. Baxter*. Penfield creek, *L. Holzer*. Mendon. Caledonia, Livingston county. Bergen swamp, Genesee county. Wayne county.

130. RIBES L.

319. **R. Cynosbati** L. PRICKLY GOOSEBERRY.
River banks and woods; common.

320. **R. rotundifolium** Michx. Orleans county, *Miss Lucy Weld*.

321. **R. oxyacanthoides** L. (*R. hirtellum* Michx.)
Low grounds; not common.

322. **R. prostratum** L'Her. FETID CURRANT. Rare. *L. Holzer*.

323. **R. floridum** L'Her. WILD BLACK CURRANT.
Wet woods, river banks, and along streams; frequent.

324. R. NIGRUM L. GARDEN BLACK CURRANT. Escape, *Dr. C. M. Booth*.

325. R. RUBRUM L. GARDEN CURRANT.
Escaped to woods on the bank of Genesee river, in Seneca park.

326. **R. rubrum** L. var. **subglandulosum** Maxim. [*R. rubrum* L.]
Swamps and cold damp woods; infrequent. Irondequoit. Greece. Gates. Wayne county.

CRASSULACEÆ.

131. PENTHORUM Gronov. [L.]

327. **P. sedoides** L. DITCH STONE-CROP.
Open wet places, fields, ditches; common.

132. SEDUM Tourn. [L.]

328. S. TERNATUM Michx. Monroe county, *Dr. Searing*. Wayne county.

329. S. ACRE L. GOLDEN STONE-CROP. Escape. Infrequent.

330. S. TELEPHIUM L. LIVE-FOR-EVER.
Adams Basin, *M. S. Baxter*. Roadside, Bergen, Genesee county, *J. B. Fuller*. Wayne county.

331. S. REFLEXUM L. Wayne county.

DROSERACEÆ.

133. DROSERA L.

332. **D. rotundifolia** L. ROUND-LEAVED SUNDEW.
Sphagnum swamps; frequent.

333. **D. intermedia** Hayne, var. **Americana** DC. (*D. longifolia* Manual.) [*D. intermedia* Hayne.] LONG-LEAVED SUNDEW.
Rare. Sphagnum swamps, Mendon.

D. linearis was reported in the check list of Mr. E. L. Hankenson, from Newark, Wayne county, N. Y.

HAMAMELIDEÆ.

134. HAMAMELIS L.

334. **H. Virginiana** L. WITCH-HAZEL.
River banks, ravines, woods, thickets; common.

HALORAGEÆ. [HALORRHAGIDACEÆ.]

135. MYRIOPHYLLUM Vaill. [L.]

335. **M. spicatum** L. COMMON WATER-MILFOIL.
Common in Irondequoit bay and other bays along lake Ontario. Lake marsh, Bald Eagle creek, Kendall, Orleans county. Wayne county.

336. **M. verticillatum** L.
Rare. Irondequoit bay, *Dr. Booth, G. T. Fish*. Wayne county.

337. **M. heterophyllum** Michx.
Rare. Irondequoit bay, *Dr. C. M. Booth*. Kendall, Orleans county, *M. S. Baxter*. Sodus bay, Wayne county, *G. T. Fish*.

136. PROSERPINACA L.

338. **P. palustris** L. MERMAID-WEED.
Rare. Wayne county, *E. L. Hankenson*.

137. CALLITRICHE L.

339. **C. verna** L. [*C. palustris* L.] WATER STARWORT.
Rare. Muddy ground, overflowed early in the season. Charlotte, *Dr. Booth!* Black creek, near Genesee river, *M. S. Baxter*. Wayne Co.

138. LYTHRUM L.

340. L. ALATUM Pursh.
Rare. Along railroad track, Adams Basin, *M. S. Baxter*. Probably introduced.

341. L. SALICARIA L. SPIKED LOOSESTRIFE.
Rare. Shore of Irondequoit bay, *Dr. Searing*. Near the Rapids, *Mrs. M. E. Streeter*. Clyde, Wayne county, *E. L. Hankenson*.

139. DECODON Gmel.

342. **D. verticillatus** Ell. (*Nesæa verticillata* HBK.) [*Decodon verticillatus* (L.) Ell.] SWAMP LOOSESTRIFE.
Swamps and borders of ponds; infrequent. Common in the marshes bordering Irondequoit bay.

ONAGRACEÆ.

140. LUDWIGIA L.

343. **L. palustris** Ell. [*L. palustris* (L.) Ell.] WATER PURSLANE.
Ditches and low grounds; common.

141. EPILOBIUM L.

344. **E. angustifolium** L. [*Chamænerion angustifolium* (L.) Scop.] GREAT WILLOW-HERB. FIRE-WEED.
Copses and newly cleared lands; common.

345. **E. lineare** Muhl.
Scarce. Near Rochester, *Dr. C. M. Booth*. Bank of Genesee river, Chili, *Miss F. Beckwith*. Wayne county.

346. **E. strictum** Muhl. (*E. molle* Torr.)
Marshes and wet places; not common. Near Rochester, *Dr. Booth*. Mendon. Adams Basin, *M. S. Baxter*. Wayne county.

347. **E. coloratum** Muhl.
Ravines, low grounds, along streams, etc.; common.

142. ŒNOTHERA L.

348. **O. biennis** L. [*Onagra biennis* (L.) Scop.] EVENING PRIMROSE.
Fields, roadsides, waste places; common.

349. **O. pumila** L. [*Kneiffia pumila* (L.) Spach.]
Rare. *Prof. W. H. Lennon*.

350. **O. fruticosa** L. [*Kneiffia fruticosa* (L.) Raimann.] SUNDROPS.
Rare. Near Culver street bridge, Brighton, *Dr. C. M. Booth*.

143. GAURA L.

351. **G. biennis** L.
Dry banks and fields; not common. River road, Chili, *Mrs. J. H. Maguire* and *Miss F. Beckwith*. Hanford's Landing. Parma, *Bradley*.

144. CIRCÆA Tourn. [L.]

352. **C. Lutetiana** L. ENCHANTER'S NIGHTSHADE.
Damp woods; common.

353. **C. alpina** L.
Cool woods, ravine sides, swamps; common.

CUCURBITACEÆ.

145. SICYOS L.

354. **S. angulatus** L. BUR-CUCUMBER.
River banks; not common.

146. ECHINOCYSTIS Torr. & Gray. [MICRAMPELIS Raf.]

355. **E. lobata** Torr. & Gray. [*Micrampelis lobata* (Michx.) Greene.] WILD CUCUMBER.
River banks, waste places; frequent. Often cultivated.

UMBELLIFERÆ.

147. DAUCUS Tourn. [L.]

356. D. CAROTA L. WILD CARROT. Abundant and troublesome.

148. ANGELICA L.

357. **A. hirsuta** Muhl. (*Archangelica hirsuta* Torr. & Gray.) [*Angelica villosa* (Walt.) B. S. P.]
Dry banks, borders of woods; frequent.

358. **A. atropurpurea** L. (*Archangelica atropurpurea* Hoffm.)
River banks, borders of marshes; frequent.

149. CONIOSELINUM Fisch. [Hoffm.]

359. **C. Canadense** Torr. & Gray. [*C. Chinense* (L.) B.S.P.] HEMLOCK PARSLEY.
Rare. Caledonia, Livingston county, *G. W. Clinton in 17th N. Y. Rep.* Bergen, Genesee county, *Cat. Plants of Buffalo*.

150. HERACLEUM L.

360. **H. lanatum** Michx. COW PARSNIP.
River flats and low grounds; not common.

151. PASTINACA L.

361. P. SATIVA. PARSNIP.
Roadsides, waste places, banks of streams; frequent.

152. THASPIUM Nutt.

362. **T. barbinode** Nutt. [*T. barbinode* (Michx.) Nutt.]
Rare. River bank, Genesee Valley park, *Dr. C. M. Booth!*

153. PIMPINELLA L.

363. **P. integerrima** Benth. & Hook. (*Zizia integerrima* DC.) [*Pimpinella integerrima* (L.) A. Gray.]
Dry banks, ravines, thickets; common.

154. BUPLEURUM L.

364. B. ROTUNDIFOLIUM L.
Rare. Ontario, Wayne county, *E. L. Hankenson*.

155. CRYPTOTÆNIA DC. [DERINGA Adans.]

365. **C. Canadensis** DC. [*Deringa Canadensis* (L.) Kuntze.] HONEWORT.
Moist woods and shaded places; frequent.

156. SIUM Tourn. [L.]

366. **S. cicutæfolium** Gmelin. (*S. lineare* Michx.) WATER PARSNIP.
Marshes; frequent.

157. ZIZIA Koch.

367. **Z. aurea** Koch. (*Thaspium aureum* var. *apterum* Gray, Man.) [*Zizia aurea* (L.) Koch.]
Dry woods and thickets, river banks, meadows, etc.; common.

368. **Z. cordata** DC. (*Thaspium trifoliatum* var. *apterum* Gray, Manual.) [*Zizia cordata* (Walt.) DC.]
Dry woods, thickets, meadows; common.

158. CARUM L.

369. C. CARUI L. CARAWAY. Naturalized in various places: Brighton, Penfield, Gates, Adams Basin, and elsewhere.

APIUM L.

— A. GRAVEOLENS L. CELERY. Roadsides; occasional.

159. CICUTA L.

370. **C. maculata** L. WATER-HEMLOCK.
Marshes, swamps, and meadows; frequent.

371. **C. bulbifera** L.
Frequent in the marshes about Irondequoit bay and elsewhere.

160. CONIUM L.

372. C. MACULATUM L. POISON HEMLOCK.
Roadsides and waste places; common.

161. CHÆROPHYLLUM L.

373. **C. procumbens** Crantz. [*C. procumbens* (L.) Crantz.]
Rare. Wayne county, *E. L. Hankenson*.

162. OSMORRHIZA Raf.

374. **O. brevistylis** DC. [*O. Claytoni* (Michx.) B.S.P.] HAIRY SWEET-CICELY. Rich woods, ravines, thickets; common.

375. **O. longistylis** DC. [*O. longistylis* (Torr.) D.C.] SMOOTH SWEET-CICELY. Same range as the last, but less frequent.

CORIANDRUM L.

— C. SATIVUM L. CORIANDER. Appears occasionally along the banks of the river and by roadsides.

163. HYDROCOTYLE Tourn. [L.]

376. **H. Americana** L. WATER PENNYWORT.
Moist and springy places; not common. Irondequoit, *Dr. C. M Booth!* Mendon, *M. S. Baxter*.

164. SANICULA Tourn. [L.]

377. **S. Marylandica** L. BLACK SNAKEROOT.
Woods and thickets; frequent.

378. **S. gregaria** Bicknell, Bull. Torr. Bot. Club, XII, (1895), p. 351.
Woods and thickets; frequent.

379. **S. trifoliata** Bicknell, Bull. Torr. Bot. Club, XII, (1895), p. 351.
Rich woods; infrequent.

ARALIACEÆ.

165. ARALIA Tourn. [L.]

380. **A. racemosa** L. SPIKENARD.
River banks, ravines, rich woods; frequent.

381. **A. hispida** Vent. BRISTLY SARSAPARILLA.
Low ground corner Norton and St. Joseph streets, *L. Holzer*. Abundant in some of the marshes at Mendon ponds. Dry knoll on the border of Bergen swamp. Wayne county.

382. **A. nudicaulis** L. WILD SARSAPARILLA.
Woods, river banks, ravines; common.

383. **A. quinquefolia** Decsne. & Planch. [*Panax quinquefolium* L.] GINSENG.
Rich cool woods; rare.

384. **A. trifolia** Decsne. & Planch. [*Panax trifolium* L.] DWARF GINSENG.
Rich woods and thickets; common.

CORNACEÆ.

166. CORNUS Tourn. [L.]

385. **C. Canadensis** L. DWARF CORNEL.
Damp woods and borders of swamps; not uncommon.

386. **C. florida** L. FLOWERING DOGWOOD.
Woods and river banks; common.

387. **C. circinata** L'Her. ROUND-LEAVED CORNEL.
River banks, ravines, borders of woods; common.

388. **C. sericea** L. [*C. Amonum* Mill.] KINNIKINNIK.
Low grounds, swamps, along streams, fences, etc.; very common.

389. **C. stolonifera** Michx. RED OSIER.
Low ground; common.

390. **C. paniculata** L'Her. [*C. candidissima* Marsh.] PANICLED CORNEL.
River banks, hillsides, and thickets; common.

391. **C. alternifolia** L.f. ALTERNATE-LEAVED CORNEL.
River banks, ravines, woods; common.

167. NYSSA L.

392. **N. sylvatica** Marsh. (*N. multiflora* Wang.) [*N. aquatica* L.] TUPELO. PEPPERIDGE.
Scarce. Hudson street. Near the corner of Clinton street and the Ridge road. Seneca park. Irondequoit. Gates. Chili. Mendon. From one to six specimens at each station. Wayne county.

CAPRIFOLIACEÆ.

168. SAMBUCUS Tourn. [L.]

393. **S. Canadensis** L. COMMON ELDER.
Roadsides, fences, fields, banks of streams; common.

394. **S. racemosa** L. (*S. pubens* Michx.) [*S. pubens* Michx.] RED-BERRIED ELDER. River banks and ravines; frequent.

169. VIBURNUM L.

395. **V. lantanoides** Michx. [*V. alnifolium* Marsh.] HOBBLE-BUSH.
Scarce. Near Rochester, *Dr. C. M. Booth*. Webster, *G. T. Fish*, *M. S. Baxter*. Wayne county.

396. **V. Opulus** L. CRANBERRY-TREE.
Low ground and swamps; not common.

397. **V. acerifolium** L. MAPLE-LEAVED ARROW-WOOD.
Dry hilly woods and river banks; common.

398. **V. pubescens** Pursh. [*V. pubescens* (Ait.) Pursh.] DOWNY ARROW-WOOD.
Rocky banks and ravines; frequent.

399. **V. dentatum** L. Low grounds ; frequent.

400. **V. cassinoides** L. (*V. nudum* var. *cassinoides* T. & G.) WITHE-ROD.
Not common. Sphagnum swamps at Mendon.

401. **V. Lentago** L. SWEET VIBURNUM. SHEEP-BERRY.
Open woods, low grounds ; frequent.

170. TRIOSTEUM L.

402. **T. perfoliatum** L. HORSE GENTIAN.
Rich deep soil ; somewhat scarce. Brighton. Penfield. Caledonia. Le Roy. Clarendon.

171 LINNÆA Gronov. [L.]

403. **L. borealis** Gronov. TWIN-FLOWER.
Mossy woods and cold marshes. Riga, *Miss F. Beckwith*. Mendon, *G. T. Fish*. Caledonia, Livingston county. Frequent in the cold woods bordering Bergen swamp. Wayne county.

172. SYMPHORICARPOS Dill. [Juss.]

404. **S. vulgaris** Michx. [*S. Symphoricarpos* (L.) McM.] INDIAN CURRANT.
Rare. *L. Holzer*.

405. **S. racemosus** Michx. SNOWBERRY.
Rare. Bank Genesee river, near lower falls, *J. B. Fuller;* near Charlotte, *M. S. Baxter*. Bank of Oak Orchard creek, *M. S. Baxter*.

406. **S. racemosus** Mx. var. **pauciflorus** Robbins. [*S. pauciflorus* (Robbins) Britton.] "The Gulf", near Mumford, Genesee county, *Miss Beckwith*.

173. LONICERA L.

407. L. TARTARICA L. TARTARIAN HONEYSUCKLE.
Naturalized in several places.

408. **L. ciliata** Muhl. FLY-HONEYSUCKLE.
River banks, ravines, and damp woods ; common.

409. **L. cœrulea** L. MOUNTAIN FLY-HONEYSUCKLE.
Bergen, *Dr. Searing*. Wayne county, *E. L. Hankenson*.

410. **L. oblongifolia** Muhl. [*L. oblongifolia* (Goldie) Hook.] SWAMP FLY-HONEYSUCKLE.
Swamps ; rare. Seneca park, *C. C. Laney*. Mendon, *G. T. Fish*. Adams Basin, *M. S. Baxter*. Caledonia. Bergen swamp.

411. **L. glauca** Hill. (*L. parviflora* Lam.) [*L. dioica* L.]
Rocky banks Genesee river, ravines, etc.; frequent.

174 DIERVILLA Tourn. [Mœnch.]

412. **D. trifida** Mœnch. [*D. Diervilla* (L.) McM.] BUSH HONEYSUCKLE.
River banks, ravines, dry woods ; frequent.

RUBIACEÆ.

175. HOUSTONIA L.

413. **H. cœrulea** L. BLUETS. INNOCENCE.
Local. Abundant on the hills at Canandaigua lake.

414. **H. purpurea** L. var. **ciliolata** Gray. [*H. ciliolata* Torr.]
Rare. Bank Genesee river, at upper falls, Rochester. Caledonia, Livingston county, *Mrs. N. G. Mathews*.

415. **H. purpurea** L. var. **longifolia** Gray. [*H. longifolia* Gærtn.]
Scarce. Rochester, *Dr. C. M. Booth*. Mumford, *M. S. Baxter*. Caledonia, *Miss Mary E. Roberts*.

176. CEPHALANTHUS L.

416. **C. occidentalis** L. BUTTON-BUSH.
Swamps, borders of ponds and streams; frequent.

177. MITCHELLA L.

417. **M. repens** L. PARTRIDGE-BERRY. Woods; common.

178. GALIUM L.

418. **G. verum** L. YELLOW BEDSTRAW.
Neglected lawn, East ave., Rochester; has been spreading since 1882.

419. **G.** MOLLUGO L.
Along N.Y.C. railroad, Gates, *Miss Florence Beckwith*.

420. **G. Aparine** L. CLEAVERS.
Swamps, damp thickets, shaded grounds; abundant.

421. **G. pilosum** Ait.
Rare. Irondequoit, near Sea Breeze. Wayne county.

422. **G. circæzans** Michx. WILD LIQUORICE.
Woods, ravines, river banks; frequent.

423. **G. lanceolatum** Torr. WILD LIQUORICE.
Same range as the last; frequent.

424. **G. boreale** L. NORTHERN BEDSTRAW.
River banks, sandy ridges, and occasionally in swamps; frequent. Cliffs and banks of Genesee river. Penfield. Mendon. Bergen.

425. **G. trifidum** L. [*G. trifidum* L., incl. var. *pusillum* Gray.]
Marshes and wet places; common.

426. **G. trifidum** L. var. **pusillum** Gray.
Marshes bordering Genesee river.

427. **G. trifidum** L. var. **latifolium** Torr. [*G. tinctorium* L.]
Rare? *Dr. Anna H. Searing*.

428. **G. asprellum** Michx. ROUGH BEDSTRAW.
Swamps, wet meadows, low woods; common.

429. **G. triflorum** Michx. SWEET-SCENTED BEDSTRAW.
Woods; common.

VALERIANACEÆ.

179. VALERIANA Tourn. [L.]

430. **V. sylvatica** Banks.
Sphagnum swamps; rare. Mendon swamp, *G. T. Fish!* Bergen swamp, Genesee county. North of Newark, Wayne county.

180. VALERIANELLA Tourn. [Poll]

431. V. OLITORIA Poll. (*Fedia olitoria* Vahl.) [*V. Locusta* (L.) Bettke.] Rare. Hanford's Landing, *M. S. Baxter*. Scottsville, *L. Holzer*. *Dr. Searing*. *Prof. Lennon*.

432. **V. chenopodifolia** DC. (*Fedia Fagopyrum* Torr. & Gray.) [*V. chenopodiifolia* (Pursh) DC.] Rare. Wayne county.

DIPSACEÆ.

181. DIPSACUS Tourn. [L.]

433. D. SYLVESTRIS Mill. [Huds.] WILD TEASEL. Fields and roadsides; very common.

COMPOSITÆ.

VERNONIA Schreb.

— V. ALTISSIMA Nutt. [*V. gigantea* (Walt.) Britton.] Appeared in a waste lot adjoining a poultry yard, Rochester, in 1867.

182. MIKANIA Willd. [WILLOUGHBYA Neck.]

434. **M. scandens** L. [*Willoughbya scandens* (L.) Kuntze.] CLIMBING HEMP-WEED. Copses along streams; rare. Red creek, *Dr. C. M. Booth*, *G. T. Fish*. River road, *Mrs. J. H. McGuire*. Wayne county.

183. EUPATORIUM Tourn. [L.]

435. **E. purpureum** L. JOE-PYE WEED. Low grounds; common.

436. **E. perfoliatum** L. THOROUGHWORT. BONESET. Low grounds; common.

437. **E. ageratoides** L. WHITE SNAKE-ROOT. Rich woods, river banks and ravines; common.

184. SOLIDAGO L. GOLDEN ROD.

438. **S. squarrosa** Muhl. Frequent along the banks of Genesee river and in ravines. Wayne county.

439. **S. cæsia** L. River banks, ravines, rich woods; common.

440. **S. latifolia** L. [*S. flexicaulis* L.] Shaded banks and ravines; frequent.

441. **S. bicolor** L. Dry banks, hillsides and woods; common.

442. **S. uliginosa** Nutt. (*S. stricta* Man.) Swamps; rare. Caledonia, Livingston county. Bergen swamp, Genesee county, *40th N. Y. Rep.* Wayne county.

443. **S. patula** Muhl. Swamps; common.

444. **S. rugosa** Mill. (*S. altissima* Torr. & Gray.) Borders of woods, fields, copses; frequent.

445. **S. ulmifolia** Muhl.
Swamps; scarce. *G. T. Fish*. Adams Basin and Bergen swamp, *M. S. Baxter*.

446. **S. neglecta** Torr. & Gray.
Swamps; rare. Mendon. Caledonia, Livingston county. Bergen, Genesee county. Wayne county.

447. **S. neglecta** T. & G. var. **linoides** Gray. [*S. uniligulata* (DC) Porter.]
Rare. Bergen swamp, Genesee county.

448. **S. arguta** Ait. (*S. Muhlenbergii* Torr. & Gray.)
Fields, copses and moist woods; frequent.

449. **S. juncea** Ait. (*S. arguta* Torr. & Gray.)
River banks, borders of woods and fields; common.

450. **S. serotina** Ait. (*S. gigantea* Man.)
Borders of woods and copses; frequent.

451. **S. serotina** Ait. var. **gigantea** Gray. (*S. serotina* Man.) [*S. serotina gigantea* (Ait.) A. Gray.]
Low grounds and along streams; frequent.

452. **S. Canadensis** L.
Roadsides, fence-rows, fields; common and abundant.

453. **S. nemoralis** Ait. Dry fields; common.

454. **S. Ohioensis** Riddell.
Swamps and along streams; rare. Bank of Genesee river, near the lower falls, Rochester, *J. B. Fuller*. Bergen swamp. Wayne county.

455. **S Houghtonii** Torr. & Gray.
Rare. Bergen swamp, *Dr. C. M. Booth* and *G. T. Fish!*

456. **S. lanceolata** L. [*Euthamia graminifolia* (L.) Nutt.]
Fields, in low wet or on high dry ground; not common. Abundant along the Swamp road in Seneca park, and on dry knolls in Gates. Rochester. Brighton. Ogden. Hamlin. Wayne county.

457. S. TENUIFOLIA Pursh. [*Euthamia Caroliniana* (L.) Greene.]
Rare. Sand-bar, Irondequoit bay, *G. T. Fish*. Introduced.

185. SERICOCARPUS Nees.

458. **S. conyzoides** Nees. [*S. asteroides* (L.) B.S.P.]
Copses, wooded hillsides, along river banks and ravines, in dry ground; common.

186. ASTER L.

459. **A. corymbosus** Ait. [*A. divaricatus* L.]
Borders of woods and thickets; frequent.

460. **A. macrophyllus** L.
River banks, along streams, and in rich woods; common.

461. **A. Novæ-Angliæ** L.
Low grounds, along streams, roadsides, hillsides; abundant.
Form with flowers nearly white, roadside, Gates, *Miss F. Beckwith*.

462. **A. Novæ=Angliæ** L. var. **roseus** Gray. [*Aster Novæ-Angliæ roseus* (Desf.) D.C.] Infrequent.

463. **A. azureus** Lindl. Rare. *Dr. Searing.*

464. **A undulatus** L.
Dry copses and woodlands; common. Occasionally with many of the disk flowers ligulate—about forty ligulate flowers in each head.

465. **A. cordifolius** L.
Woods, fields, hillsides; very common.

466. **A. sagittifolius** Willd. [*A. sagittifolius* Wedem.]
River banks, ravine sides, borders of woods; common.

467. **A. lævis** L.
Borders of woods, fields, hillsides; common. Very abundant in Seneca park from Maple grove to River Side avenue.

468. **A. ericoides** L. *L. Holzer. Prof. Lennon.*

469. **A. multiflorus** Ait. Rare. In a field in Gates, *G. T. Fish.*

470. **A. dumosus** L. *Prof. Lennon. Miss Lucy Weld.*

471. **A. vimineus** Lam. (*A. Tradescanti* Man.)
Woods, low grounds, along streams and fences; common.

472. **A. diffusus** Ait. (*A. miser* Man.) [*A. lateriflorus* (L.) Britton.]
Thickets and fields; common.

473. **A. diffusus** Ait. var. **hirsuticaulis** Gray. [*A. lateriflorus hirsuticaulis* (Lindl.) Porter.]
Rare. Bank of Genesee river, below lower falls, *J. B. Fuller.*

474. **A Tradescanti** L. (*A. tenuifolius* Man.)
Bergen swamp, Genesee county, *Dr. Anna H. Searing.*

475. **A. paniculatus** Lam. (*A. simplex* Man.)
Low grounds; common.

476. **A. salicifolius** Ait. (*A. carneus* Man.)
Low grounds; infrequent.

477. **A. junceus** Ait. (*A. æstivus* Man.)
Sphagnum swamp adjoining Harris pond, Mendon. Wayne county.

478. **A. prenanthoides** Muhl.
Rich woods, low grounds and swamps; common.

479. **A. puniceus** L.
Marshes and low grounds; common.
Form with green stem and white flowers, Hamlin, *Miss F. Beckwith.*

480. **A. puniceus** L. var. with purple stems, nearly smooth, flowers pinkish.
Low ground near western "wide-water", *J. B. Fuller.*

481. **A. puniceus** L. var. **lucidulus** Gray.
Low ground, border of woods, Greece, *J. B. Fuller.*

482. **A. umbellatus** Mill. (*Diplopappus umbellatus* Torr. & Gray.)
Swamps; abundant.

483. **A. ptarmicoides** Torr. & Gray. [*A. ptarmicoides* (Nees.) Torr. & Gray.] Very rare. Rocky bank of Genesee river, below the lower falls, *Dr. C. M. Booth.*

484. **A. acuminatus** Michx.
Cool rich woods and ravines; scarce. Greece, *Dr. A. H. Searing* and *Miss Beckwith.* Brockport, *Prof. Lennon.* Sweden, *M. S. Baxter.*

187. ERIGERON L.

485. **E. Canadensis** L. HORSEWEED.
Fields, roadsides, waste places; common.

486. **E. annuus** Pers. [*E. annuus* (L.) Pers.] DAISY FLEABANE.
Fields and waste places; common.

487. **E. strigosus** Muhl. [*E. ramosus* (Walt.) B.S.P.] DAISY FLEABANE.
Fields; common.

488. **E. bellidifolius** Muhl. [*E. pulchellus* Michx.] ROBIN'S PLANTAIN.
Banks and hillsides; frequent.

489 **E. Philadelphicus** L.
Moist ground, ravines, and grassy banks; common, often abundant.

188. ANTENNARIA Gærtn.

490. **A. plantaginifolia** Hook. [*A. plantaginifolia* (L.) Richards.] PLANTAIN-LEAVED EVERLASTING.
Tops of river banks and ravines, sterile knolls, dry pastures; common.

189. ANAPHALIS DC.

491. **A. margaritacea** Benth. & Hook. (*Antennaria margaritacea* R. Br.) [*Antennaria margaritacea* (L.) Hook.] PEARLY EVERLASTING.
Dry fields, hills, and woods; common.

190. GNAPHALIUM L.

492. **G. polycephalum** Michx. [*G. obtusifolium* L.] COMMON EVERLASTING.
Old fields and dry woods; common.

493. **G. decurrens** Ives. COMMON EVERLASTING.
Dry woods and old fields; frequent.

494. **G. uliginosum** L. LOW CUDWEED.
In leached soil, low grounds, roadsides, ditches; common.

191. INULA L.

495. I. HELENIUM L. ELECAMPANE.
Borders of woods, pastures, along streams and roadsides; common.

192. POLYMNIA L.

496. **P. Canadensis** L. LEAF-CUP.
Abundant in woods near Cedar Swamp station, Henrietta; rare elsewhere. Le Roy and Bergen, Genesee county.

497. **P. Uvedalia** L.
Rare. Ravine near Canandaigua lake, *E. J. Durand.*

193. AMBROSIA Tourn. [L.]

498. **A. trifida** L. GREAT RAGWEED.
Abundant along Honeoye creek, especially at Rush Junction, and at the mouth of Oatka creek, Scottsville; occasional elsewhere. Canandaigua lake, *Miss Mary E. Macauley.*

499. **A. artemisiæfolia** L. HOGWEED. RAGWEED.
Fields, roadsides, and waste places; very common.

194. XANTHIUM Tourn. [L.]

500. X. STRUMARIUM L. COCKLE-BUR.
Frequent about Rochester. Adams Basin. Wayne county.

501. **X. Canadense** Mill. COCKLE-BUR.
Along streams; common.

502. **X. Canadense** Mill. var. **echinatum** Gray.
Same range as the preceding; common.

195. HELIOPSIS Pers.

503. **H. lævis** Pers. [*H. helianthoides* (L.) B.S.P.] OX-EYE.
River banks, ravines, and along streams; common.

504. **H. scabra** Dunal. (*H. lævis* var. *scabra* Torr. & Gray.) Rare.

196. ECHINACEA Mœnch. [BRAUNERIA Neck.]

505. E. ANGUSTIFOLIA DC. [*Brauneria pallida* (Nutt.) Britton.] PURPLE CONE-FLOWER.
Introduced from the west. Railroad embankment, Adams Basin, *M. S. Baxter.*

197. RUDBECKIA L.

506. **R. laciniata** L. CONE-FLOWER.
River banks, ravine sides, along streams; common.

507. **R. hirta** L. YELLOW DAISY. CONE-FLOWER.
Fields; very common.

508. **R. hirta** L. var. ———. A form with band of dark brown at base of ray flowers was found in the town of Gates, near Rochester, in 1891, by Miss Beckwith; again in 1892 and 1893. See Proc. Roch. Acad. Sc., Vol. II, Broch. 2, pp. 170, 171; Broch. 3, p. 241.

198. HELIANTHUS L. SUNFLOWER.

— H. ANNUUS L. Frequently spontaneous, but not permanent.

509. **H. divaricatus** L.
Dry woods, river banks, tops of ravines; common.

510. **H. strumosus** L.
River banks, sides of ravines, copses, in rich and usually moist soil.

511. **H. strumosus** L. var. **mollis** Torr. & Gray. [*H. strumosus macrophyllus* (Willd.) Britton.] Rare. Greece, *Bradley.*

512. **H. decapetalus** L.
River banks and ravines; not common.

513. **H. tuberosus** L. JERUSALEM ARTICHOKE.
Alluvial soil; not common.

199. COREOPSIS L.

514. **C. discoidea** Torr. & Gray. [*Bidens discoidea* (T. & G.) Britton.]
Rare. Sandbar and lake shore, Irondequoit, *J. B. Fuller.*

200. BIDENS L.

515. **B. frondosa** L. STICK-TIGHT. BEGGAR-TICKS.
Low ground and moist waste places; common.

516. **B. connata** Muhl. SWAMP BEGGAR-TICKS.
Along ditches, brooks, etc.; frequent.

517. **B. cernua** L.
Shores, swamps, ditches, wet places; common.

518. **B. chrysanthemoides** Michx. [*B. lævis* (L.) B.S.P.]
Borders of streams, marshes and ditches; common.

519. **B. bipinnata** L. SPANISH NEEDLES.
Rare. Long pond, *Dr. Anna H. Searing.*

520. **B. Beckii** Torr. WATER MARIGOLD.
Rare. Sodus bay, *G. T. Fish.*

201. HELENIUM L.

521. **H. autumnale** L. SNEEZE-WEED.
River flats, wet ground, along streams; frequent.

202. ANTHEMIS L.

522. A. COTULA DC. [L.] (*Maruta Cotula* DC.) MAYWEED.
Roadsides and waste places; abundant.

523. A. ARVENSIS L. CORN CHAMOMILE.
Fields, roadsides, waste places; common.

203. ACHILLEA L.

524. **A. Millefolium** L. YARROW.
Fields, roadsides, waste places; common. The pink-flowered form frequent.

204. CHRYSANTHEMUM Tourn. [L.]

525. C. LEUCANTHEMUM L. (*Leucanthemum vulgare* Lam.) OX-EYE DAISY.
Fields and meadows; very abundant.

526. C. LEUCANTHEMUM L. var. TUBULIFLORUM Tenney.
Greece, north of the Ridge road, *Mrs. J. J. Kempe.*

527. C. PARTHENIUM Pers. (*Leucanthemum Parthenium* Godron.) [*Chrysanthemum Parthenium* (L.) Pers.] FEVERFEW. Escaped.

205. TANACETUM L.

528. T. VULGARE L. COMMON TANSY. Roadsides; frequent.

206. ARTEMISIA L.

529. **A. caudata** Michx.
Rare. Shore of lake Ontario, Webster, *Dr. C. M. Booth.*

530. **A. Canadensis** Michx.
Rare. Bluffs along lake Ontario and Irondequoit bay.

531. A. VULGARIS L. COMMON MUGWORT.
Waste places; abundant in the south-eastern part of Rochester.

532. A. BIENNIS Willd.
Rare. Recently introduced along N.Y.C. railroad, *Miss Beckwith*.

533. A. ABSINTHIUM L. COMMON WORMWOOD.
Occasional in fields and by roadsides.

207. TUSSILAGO Tourn. [L.]

534. T. FARFARA L. COLTS-FOOT.
Wet clay soil. Banks Genesee river, Rochester. Sweden. Caledonia, Livingston county. Bergen, Genesee county. Wayne county.

208. PETASITES Tourn.

535. **P. palmata** Gray. (*Nardosmia palmata* Hook.) [*Tussilago palmata* Ait.] SWEET COLT'S-FOOT.
Rare. Cleared swamp in Irondequoit, *Dr. C. M. Booth*.

209. SENECIO Tourn. [L.]

536. S. VULGARIS L. COMMON GROUNDSEL.
Waste grounds and cultivated fields; common about Rochester.

537. **S. aureus** L.
Common in wet ground.

538. **S. aureus** L. var. **Balsamitæ** Torr. & Gray. [*S. Balsamitæ* Muhl.]
Rare. Bergen swamp, Genesee county.

210. CACALIA L.

539. **C. suaveolens** L. INDIAN PLANTAIN.
Rare. Shore of Irondequoit bay, *Dr. C. M. Booth*. Penfield, *G. T. Fish*. Bank of Genesee river, near the mouth of Black creek, *M. S. Baxter*. Avon, Livingston county, *Dr. B. D. Greene in Buff. Cat.*

540. **C. atriplicifolia** L.
Rare. Near Rochester, *Z. H. Harris*. Greece, *Bradley*.

211. ERECHTITES Raf.

541. **E. hieracifolia** Raf. [*E. hieracifolia* (L.) Raf.] FIRE-WEED.
Moist woods and recent clearings; common.

CALENDULA L.

— C. OFFICINALIS L. POT or CAPE MARIGOLD. Escaped to roadside.

212. ARCTIUM L.

542. A. LAPPA L. (*Lappa officinalis* All.) BURDOCK.
Waste places; common.

213. CNICUS Tourn. (CIRSIUM Tourn. of Man.)

543. C. LANCEOLATUS Hoffm. (*Cirsium lanceolatum* Scop.) [*Carduus lanceolatus* L.] COMMON THISTLE.
Pastures, roadsides and waste places; common.

544. **C. altissimus** Willd. var. **discolor** Gray. (*Cirsium discolor* Spreng.) [*Carduus discolor* (Muhl.) Nutt.]
Borders of woods; scarce.

545. **C. muticus** Ph. (*Cirsium muticum* Mx.) [*Carduus muticus* (Mx.) Pers.] SWAMP THISTLE.
Swamps; not common. Scottsville. Caledonia, Livington county. Bergen, Genesee county.

546. **C. pumilus** Torr. (*Cirsium pumilum* Spreng.) [*Carduus odoratus* (Muhl.) Porter.] PASTURE THISTLE.
Old fields; infrequent.

547. C. ARVENSIS Hoff. (*Cirsium arvense* Scop.) [*Carduus arvensis* (L.) Robs.] CANADA THISTLE.
Fields, roadsides, waste places; very common.

548. C. ARVENSIS Hoff. var. ALBIFLORUS. Frequent.

214. ONOPORDON Vaill. [L.]

549. O. ACANTHIUM L. SCOTCH THISTLE.
Roadsides and fields; scarce. North Union street and Lake avenue, Rochester. Irondequoit. Chili. Bergen. Wayne county.

SILYBUM Gærtn.

— S. MARIANUM Gærtn. [*S. Marianum* (L.) Gærtn.] MILK THISTLE.
Neglected grounds, East avenue, Rochester, 1891–1894.

215. CENTAUREA L.

550. C. BENEDICTA L. (*Cnicus benedictus* L.) [*Cnicus benedictus* L.]
Kendall, Orleans county, *Prof. W. H. Lennon.*

551. C. JACEA L. Neglected lawn, East avenue, Rochester, 1882–1894.

216. LAMPSANA Tourn. [LAPSANA L.]

552. L. COMMUNIS L.
Roadsides and grass plats; rare. Near Rochester, *Otto Betz.* Brockport, *Prof. Lennon.* Wayne county.

217. CHICORIUM Tourn. [L.]

553. C. INTYBUS L. CHICORY. SUCCORY.
Fields and roadsides; common. Abundant in many places. In the southern part of Ontario county it is known as *Evan's Pink.*

218. TRAGOPOGON L.

554. T. PORRIFOLIUS L. SALSIFY.
Fields; frequent in the vicinity of Rochester.

555. T. PRATENSIS. L. YELLOW GOAT'S-BEARD.
Rare. Waste lot, State street, Rochester, *J. B. Fuller.* Along railroad, *G. T. Fish.* Brockport, *Prof. Lennon. L. Holzer.*

219. HIERACIUM Tourn. [L.]

556. H. AURANTIACUM L.
Riga, *Miss F. Beckwith.* Pavilion, Genesee county, *J. B. Fuller.* Holley, Orleans county, *Prof. Lennon.* Abundant at these places. Becoming a pest at Kendall, Orleans county.

557. **H. Canadense** Michx.
Dry woods and roadsides; common.

558. **H. paniculatum** L.
Dry open woods; frequent.

559. **H. venosum** L. RATTLESNAKE-WEED.
Dry woods and copses; frequent.

560. **H. Marianum** Willd.
Rare. Rochester, *Mrs. Mary E. Streeter.*

561. **H. scabrum** Michx.
Dry open woods; frequent.

220. CREPIS L.

562. C. BIENNIS L.
Rare. School grounds, Fairport, *Miss Mary E. Macauley.*

563. C. TECTORUM L.
Scarce. Mount Hope, 1866, and roadside, Culver park, 1882, *J. B. Fuller.* Neglected lawn, East avenue. Brighton, *Dr. C. M. Booth.* Brockport, *Prof. Lennon.*

221. PRENANTHES Vaill. [L.]

564. **P. alba** L. (*Nabalus albus* Hook.) WHITE LETTUCE.
Rich woods and river banks; common.

565. **P. serpentaria** Pursh. (*Nabalus Fraseri* DC.) LION'S-FOOT.
Dry woods; frequent, especially on the sandy ridges about Irondequoit bay and creek.

566. **P. altissima** L. (*Nabalus altissimus* Hook.)
Moist shaded soil along river banks and in ravines; frequent.

222. TARAXACUM Haller.

567. T. OFFICINALE Weber. (*T. Dens-leonis* Desf.) [*T. Taraxacum* (L.) Karst.] DANDELION.
Very common everywhere in grass.

223. LACTUCA Tourn. [L.]

568. L. SCARIOLA L. PRICKLY LETTUCE.
Waste grounds and roadsides. Abundant in several places in and near the city of Rochester.

569. **L. Canadensis** L. WILD LETTUCE.
Borders of fields and woods; common.

570. **L. leucophæa** Gray. (*Mulgedium leucophæum* DC.) [*Lactuca spicata* (Lam.) A. S. Hitch.] BLUE LETTUCE.
Borders of woods, low grounds; common.

—— L. SATIVA L., GARDEN LETTUCE, escapes to roadsides occasionally.

224. SONCHUS L.

571. S. OLERACEUS L. COMMON SOW-THISTLE.
Roadsides and waste places; common.

572. S. ASPER Vill. [*S. asper* (L.) Vill.] SPINY LEAVED SOW THISTLE.
With the last, but less frequent.

573. S. ARVENSIS L. FIELD SOW-THISTLE.
Roadsides, waste places, and brooksides; scarce. First detected in 1864, on East Main street, Rochester, by *Dr. C. M. Booth;* again in 1866, near the mouth of Deep Hollow creek, by *J. B. Fuller.* Irondequoit bay, 1895, *Dr. C. M. Booth.* Churchville, 1893, *Miss F. Beckwith. G. T. Fish.* Newark, Wayne county, *E. L. Hankenson.*

LOBELIACEÆ.

225. LOBELIA L.

574. **L. cardinalis** L. CARDINAL FLOWER.
Low grounds, along streams and borders of woods; frequent.

575. **L. syphilitica** L. GREAT LOBELIA.
Low grounds and swampy places; common.

576. **L. spicata** Lam.
Rare. Adams Basin, *M. S. Baxter.* "The Gulf", Genesee county, *Miss F. Beckwith.* Mount Morris, *Mrs. M. E. Streeter.*

577. **L. Kalmii** L.
Wet rocks and cliffs, wet meadows, swamps; frequent.

578. **L. inflata** L. INDIAN TOBACCO.
Meadows and pastures; frequent.

CAMPANULACEÆ.

226. SPECULARIA Heister. [LEGOUZIA Durand.]

579. **S. perfoliata** A. DC. [*Legouzia perfoliata* (L.) Britton.] VENUS'S LOOKING GLASS. Dry fields; not common.

227. CAMPANULA Tourn. [L.]

580. C. RAPUNCULOIDES L.
Roadsides; infrequent. South avenue, Rochester. Rush. Gates. Adams Basin.

581. **C. rotundifolia** L. HAREBELL.
Rocky and sandy shaded banks; common.

582. **C. rotundifolia** L. var. **arctica** Lange. (*C. rotundifolia* var. *linifolia* Man.) [*C. rotundifolia Langsdorfiana* (A. D. C.) Britton.]
Rare. Ridges west of Irondequoit bay, *J. E. Paine.*

583. **C. aparinoides** Pursh. MARSH BELLFLOWER.
Shores and marshes; frequent. In 1895 *Miss F. Beckwith* collected specimens on the sandy top of Sugar-loaf hill, on the Dugway road.

584. **C. Americana** L. TALL BELLFLOWER.
Rare. "The Gulf", *Miss F. Beckwith.* Near Le Roy, Genesee county, *Miss Mary E. Macauley. L. Holzer.*

ERICACEÆ.

228. GAYLUSSACIA HBK.

585. **G. frondosa** Torr. & Gray. [*G. frondosa* (L.) T. & G.] BLUE TANGLE.
Orleans county, *Miss Lucy Weld*. Wayne county, *E. L. Hankenson*.

586. **G. resinosa** Torr. & Gray. [*G. resinosa* (Ait.) Torr. & Gray.] BLACK HUCKLEBERRY.
Frequent on the dry banks of Genesee river and tops of ravines.

229. VACCINIUM L.

587. **V. stamineum** L. DEERBERRY.
Dry woods on river banks, ravines and hills; common.

588. **V. Pennsylvanicum** Lam. DWARF BLUEBERRY.
Dry woods, banks, ravines, hillsides, fields; common.

589. **V. Canadense** Kalm. [*V. Canadense* Richards.] DOWNY BLUEBERRY.
Swamps and low woods; scarce.

590. **V. vacillans** Solander. [*V. vacillans* Kalm.] LOW BLUEBERRY.
In same situations as *V. Pennsylvanicum*, but less frequent.

591. **V. corymbosum** L. SWAMP BLUEBERRY.
Open swampy woods and sphagnum marshes; abundant.

592. **V. Oxycoccus** L. [*Schollera Oxycoccus* (L.) Roth.] SMALL CRANBERRY.
Sphagnum marshes; frequent.

593. **V. macrocarpon** Ait. [*Schollera macrocarpa* (Ait.) Britton.] LARGE CRANBERRY.
Sphagnum marshes; rare. Mendon, *Geo. T. Fish, M. S. Baxter*. Bergen, Genesee county, *Dr. Booth, Mrs. M. E. Streeter*. Wayne county.

230. CHIOGENES Salisb.

594. **C. serpyllifolia** Salisb. (*C. hispidula* T. & G.) [*C. hispidula* (L.) T. & G.] CREEPING SNOWBERRY.
Mossy knolls, under hemlocks and cedars; rare. Bergen, Genesee county. Wayne county.

231. ARCTOSTAPHYLOS Adans.

595. **A. Uva-ursi** Spreng. [*A. Uva-ursi* (L.) Spreng.] BEAR-BERRY.
Rare. "The Gulf", Genesee county, *Miss F. Beckwith*.

232. EPIGÆA L.

596. **E. repens** L. TRAILING ARBUTUS.
Dry banks of Genesee river, and on sandy hillsides; common.

233. GAULTHERIA Kalm. [L.]

597. **G. procumbens** L. WINTERGREEN.
Woods; common.

234. ANDROMEDA L.

598. **A. polifolia** L.
Abundant in sphagnum bogs at Mendon ponds. Wayne county.

235. CASSANDRA Don. [CHAMÆDAPHNE Mœnch.]

599. **C. calyculata** Don. [*Chamædaphne calyculata* (L.) Mœnch.] LEATHER-LEAF. Abundant in the bogs at Mendon. Adams Basin. Wayne Co.

236. KALMIA L.

600. **K. latifolia** L. MOUNTAIN LAUREL.
Sodus, ⅛ mile west of Wallington, 1875, 1882, *E. L. Hankenson*.

601. **K. angustifolia** L. SHEEP LAUREL.
Salmon creek and Fly creek, Sodus, Wayne county, about 1850, *Check list, E. L. Hankinson*.

237. RHODODENDRON L.

602. **R. nudiflorum** Torr. (*Azalia nudiflora* L.) [*Azalia nudiflora* L.] PINXTER-FLOWER.
Dry woods on banks and hillsides; common.

603. **R. maximum** L. GREAT LAUREL.
Rare. In a deep swamp in Webster, covering an area of about 400 square yards. Detected by *James H. Brown*, in 1892.

238. LEDUM L.

604. **L. latifolium** Ait. [*L. Grœnlandica* Œder.] LABRADOR TEA.
Cold swamps; scarce. Riga, *Miss F. Beckwith*. Adams Basin, *M. S. Baxter*. Mendon. Caledonia, *Miss Mary E. Roberts*. Frequent in Bergen swamp. Wayne county.

239. CHIMAPHILA Pursh.

605. **C. umbellata** Nutt. [*C. umbellata* (L.) Nutt.] PRINCE'S PINE.
Dry banks; frequent.

606. **C. maculata** Pursh. [*C. maculata* (L.) Ph.] SPOTTED WINTERGREEN.
Dry woods; rare. Gates, *Miss F. Beckwith*. Greece, *J. B. Fuller*. Near Rochester, *Dr. C. M. Booth* and *G. T. Fish*. Wayne county.

240. MONESES Salisb.

607. **M. grandiflora** Salisb. (*M. uniflora* Gray.) [*M. uniflora* (L.) A. Gray.]
Deep woods; rare. Greece, 1867, *J. B. Fuller*. Irondequoit, 1892, *Warner Gilbert* and *Miss Mary E. Macauley*. Penfield, 1895, *Miss F. Beckwith*. Bergen, *Miss Mary E. Macauley*.

241. PYROLA Tourn. [L.]

608. **P. secunda** L.
Dry woods, banks, hillsides; common.

609. **P. chlorantha** Swartz.
Dry woods; frequent.

610. **P. elliptica** Nutt. SHIN-LEAF.
Woods; common.

611. **P. rotundifolia** L.
Woods; abundant.

242. PTEROSPORA Nutt.

612. **P. Andromedea** Nutt. PINE-DROPS.
Dry slopes, bluffs; rare. Bluff at the northern extremity of Irondequoit bay, Webster, *Prof. Lennon* and *M. S. Baxter*. Seneca point, Canandaigua lake, *Mrs. M. E. Streeter*.

243. MONOTROPA L.

613. **M. uniflora** L. INDIAN PIPE. CORPSE-PLANT.
Deep rich woods; frequent.

614. **M. Hypopitys** L. [*Hypopitys Hypopitys* (L.) Small.] PINE-SAP.
Rich woods; infrequent.

PRIMULACEÆ.

244. TRIENTALIS L.

615. **T. Americana** Pursh. STAR-FLOWER.
Cool woods and ravines; common.

245. STEIRONEMA Raf.

616. **S. ciliatum** Raf. (*Lysimachia ciliata* L.) [*Steironema ciliatum* (L.) Baudo.] Low grounds and along streams; common.

617. **S. lanceolatum** Gray. (*Lysimachia lanceolata* Walt.) [*Steironema lanceolatum* (Walt.) A. Gray.]

246. LYSIMACHIA Tourn. [L.]

618. **L. quadrifolia** L.
Woods, banks, slopes of ravines, etc.; frequent.

619. **L. stricta** Ait. [*L. terrestris* (L.) B.S.P.]
Marshy places; frequent.

620. L. NUMMULARIA L. MONEYWORT.
Abundant on the flats along the Genesee river, in Seneca park.

621. **L. thyrsiflora** L. [*Naumbergia thyrsiflora* (L.) Duby.]
Wet meadows, marshes; infrequent.

247. ANAGALLIS Tourn. [L.]

622. A. ARVENSIS L. COMMON PIMPERNEL.
Infrequent. Sandy fields, Greece. Alluvial soil, Irondequoit. Near Highland park. Rochester, Scottsville, Canandaigua, and elsewhere.

248. SAMOLUS Tourn. [L.]

623. **S. Valerandi** L. var. **Americanus** Gray. [*S. floribundus* H.B.K.]
Frequent in wet meadows and along rivulets.

OLEACEÆ.

249. FRAXINUS Tourn. [L.]

624. **F. Americana** L. WHITE ASH.
Woods; common.

625. **F. pubescens** Lam. [*F. Pennsylvanica* Marsh.] RED ASH.
Low woods; infrequent.

626. **F. viridis** Michx.f. [*F. lanceolata* Borck.] GREEN ASH.
Rare. Low ground, Brighton.

627. **F. sambucifolia** Lam. [*F. nigra* Marsh.] BLACK ASH.
Low woods and swamps; common.

250. LIGUSTRUM Tourn. [L.]

628. L. VULGARIS L. PRIVET. Escaped. Infrequent.

APOCYNACEÆ.

251. VINCA L.

629. V. MINOR L. PERIWINKLE. CREEPING MYRTLE. Escaped. Frequent.

252. APOCYNUM Tourn. [L.]

630. **A. androsæmifolium** L. DOG-BANE.
Banks of streams, borders of woods; common.

631. **A. cannabinum** L. INDIAN HEMP.
Low grounds and shores; common.

ASCLEPIADACEÆ.

253. ASCLEPIAS L.

632. **A. tuberosa** L. BUTTERFLY-WEED. PLEURISY-ROOT.
Dry fields and banks; frequent. Common in the sandy soils of Greece and Irondequoit.

633. **A. incarnata** L. SWAMP MILKWEED.
Low grounds and shores; common.

634. **A. Cornuti** Decaisne. [*A. Syriaca* L.] COMMON MILKWEED.
Fields and roadsides; common.

635. **A. phytolaccoides** Pursh. [*A. exaltata* (L.) Muhl.] POKE MILKWEED.
Woods and shores; frequent.

636. **A. quadrifolia** L. [*A. quadrifolia* Jacq.] FOUR-LEAVED MILKWEED.
Dry woods, ravines, and slopes; common.

637. **A. verticillata** L. WHORLED-LEAVED MILKWEED.
Rare. Near Rochester, *Dr. C. M. Booth*. Penfield, *L. Holzer*. Perinton, *Miss Mary E. Macauley*. *Mrs. Mary E. Streeter*.

254. VINCETOXICUM Mœnch. [CYNANCHUM L.]

638. V. NIGRUM Mœnch. [*Synanchum nigrum* (L.) Pers.]
Rare. Pinnacle hills, Rochester. Wayne county.

PERIPLOCA L.

— P. GRÆCA L. Naturalized near Rochester, *Sartwell in Herb. Ham. Coll.*

GENTIANACEÆ.

255. GENTIANA Tourn. [L.]

639. **G. crinita** Frœl. FRINGED GENTIAN.
Wet places; frequent.

640. **G. serrata** Gunner. (*G. detonsa* Man.)
Rare. Bluffs along Lake Ontario in the town of Irondequoit, *Paine*.

641. **G. quinqueflora** Lam. [*G. quinquefolia* L.]
Common on the sides of hills and ridges.

642. **G. puberula** Michx.
Rare. Dry sandy ridges, west side Irondequoit bay, *Geo. T. Fish* and *J. B. Fuller.*

643. **G. Saponaria** L. SOAPWORT GENTIAN.
Rare. Greece, *Bradley.*

644. **G. Andrewsii** Griesb. CLOSED GENTIAN.
Moist or dry banks; frequent.

256. FRASERA Walt.

645. **F. Carolinensis** Walt. AMERICAN COLUMBO.
Rare. Bank Genesee river. Penfield, *Dr. C. M. Booth, L. Holzer.* East Bloomfield, Ontario county, *Sartwell.*

257. BARTONIA Muhl.

646. **B. tenella** Muhl. [*B. Virginica* (L.) B.S.P.]
Rare. Black creek, *Dr. C. M. Booth.* Adams Basin, *M. S. Baxter.* Wayne county.

258. MENYANTHES Tourn. [L.]

647. **M. trifoliata** L. BUCK-BEAN.
Swamps; scarce. Irondequoit bay, *Dr. C. M. Booth.* Charlotte, *J. B. Fuller.* Long pond, *Dr. A. H. Searing.* Mendon, *Geo. T. Fish!* Adams Basin, *M. S. Baxter.* Bergen, Genesee county. Wayne county.

POLEMONIACEÆ.

259. PHLOX L.

648. **P. divaricata** L.
Rich woods; frequent. Occasionally with entire corolla lobes.

649. **P. subulata** L. MOSS PINK.
Dry grassy banks; not common. Banks of Genesee river north of Rochester. Maxwell's Station, Caledonia, Livingston county, *Miss F. Beckwith.* Banks of Oatka creek, Le Roy, Genesee county. Flint Hill, Genesee county. Rarely with white flowers, *J. B. Fuller.*

HYDROPHYLLACEÆ.

260. HYDROPHYLLUM Tourn. [L.] WATER-LEAF.

650. **H. Virginicum** L.
Rich woods; frequent.

651. **H. Canadense** L.
Rare. Bank of Genesee river, near the lower falls. Brockport and Mendon, *M. S. Baxter.* Wayne county.

652. **H. appendiculatum** Michx.
Rare. Parma, *Bradley.*

BORRAGINACEÆ.

261. CYNOGLOSSUM Tourn. [L.]

653. C. OFFICINALE L. HOUND'S-TONGUE.
Waste grounds, roadsides, pastures; common.

654. **C. Virginicum** L. WILD COMFREY.
Rare. Rochester, 1881, *H. C. Maine*. Greece, *Bradley*. *L. Holzer*.

262. ECHINOSPERMUM Lehm. [LAPPULA Mœnch.]

655. **E. Virginicum** Lehm. (*Cynoglossum Morisoni* DC.) [*Lappula Virginiana* (L.) Greene.] BEGGAR'S LICE.
Borders of woods and thickets; frequent.

656. E. LAPPULA Lehm. [*Lappula Lappula* (L.) Karst.] STICK-SEED.
Waste grounds, roadsides, fields; common.

263. MERTENSIA Roth.

657. **M. Virginica** DC. LUNG-WORT. BLUE-BELLS.
Alluvial soil; not common. Brighton. Rich's Mills. Penfield. Rush. Scottsville. Wayne county. Ontario county.

264. MYOSOTIS Dill. [L.]

658. **M. laxa** Lehm. (*M. palustris* var. *laxa* Gray.) FORGET-ME-NOT.
Marshes and borders of streams; abundant.

659. **M. verna** Nutt.
Dry woods around Irondequoit bay; rare. Webster, *Geo. T. Fish*. Penfield, *Dr. C. M. Booth!*

265. LITHOSPERMUM Tourn. [L.]

660. L. ARVENSE L. CORN GROMWELL.
Fields and roadsides; common.

661. L. OFFICINALE L. COMMON GROMWELL.
Rich soil; infrequent. *Dr. C. M. Booth*. Scottsville, *Miss Florence Beckwith*. Adams Basin, *M. S. Baxter*. Wayne county.

662. **L. latifolium** Michx.
Rare. Near Rochester, *Dr. C. M. Booth*. Scottsville, *L. Holzer*.

663. **L. hirtum** Lehm. [*L. Gmelini* (Michx.) A. S. Hitchcock.]
Rare. Sandy hillsides, Penfield, near Irondequoit bay, *Dr. Booth*. Wilhelm's farm, Penfield, *L. Holzer*. Brighton, *G. T Fish*. Near Fairport, *Miss Mary E. Macauley*.

266. SYMPHYTUM Tourn. [L.]

664. S. OFFICINALE L. COMMON COMFREY.
Waysides and along streams; not uncommon.

665. S. ASPERRIMUM Sims. PRICKLY COMFREY.
Rare. Roadside, Chili, *Mrs. J. H. McGuire*.

267. LYCOPSIS L.

666. L. ARVENSIS L. SMALL BUGLOSS.
Rare. *Prof. Lennon*.

268. ECHIUM Tourn. [L.]

667. E. VULGARE L. BLUE-WEED.
Rare. Dry pasture, Greece, *J. B. Fuller*. Seneca park. Brockport, *M. S. Baxter*. Near Le Roy, Genesee county.

CONVOLVULACEÆ.

269. IPOMŒA L.

668. I. PURPUREA Lam. [*I. purpurea* (L.) Roth.] MORNING GLORY.
Escaped to roadsides.

270. CONVOLVULUS Tourn. [L.]

669. **C. spithamæus** L. (*Calystegia spithamæa* Pursh.)
Rare. Bank of Genesee river, below the lower falls. Irondequoit, *L. Holzer*.

670. **C. sepium** L. (*Calystegia sepium* R.Br.) HEDGE BIND-WEED.
Moist banks; common.

671. C. ARVENSIS L. FIELD BIND-WEED.
Old fields; scarce.

271. CUSCUTA Tourn. [L.]

672. **C. Gronovii** Willd.
Marshes and along streams; frequent.

SOLANACEÆ.

272. SOLANUM Tourn. [L.]

673. S. DULCAMARA L. BITTERSWEET.
Swamps, along streams, waste places near dwellings; common.
A form with white flowers is abundant at Maxwell's Station, Caledonia, Livingston county, *Miss Florence Beckwith*.

674. S. NIGRUM L. COMMON NIGHTSHADE.
Fields, low ground along streams, waste ground; frequent.

675. S. CAROLINENSE L. HORSE-NETTLE.
Rare. Macedon, Wayne county, 1883, *E. L. Hankenson*. Field near Mud pond, Wayne county, 1894, *M. S. Baxter* and *Prof. Lennon*.

676. S. ROSTRATUM Dunal.
Waste lot, Spencer street, Rochester; a few plants in 1869, increased to a large number in 1881, *J. B. Fuller*. North St. Paul street, Rochester, 1893, *J. Bishop*. A single plant at railroad depot, Newark, Wayne county, 1884, *D. van C. in check list E. L. Hankenson*.

273. PHYSALIS L.

677. P. ALKEKENGI L. WINTER CHERRY. STRAWBERRY TOMATO.
Rare. Grand avenue, Rochester, and along N.Y.C.R.R., Brighton, *Dr. C. M. Booth*.

678. **P. pubescens** L.
Rare. *Rev. John E. Baker*.

679. **P. Virginiana** Mill. (*P. viscosa* Man.)
Rare. Gates, *G. T. Fish*.

274. NICANDRA Adans. [PHYSALODES Boehm.]

680. N. PHYSALOIDES Gærtn. [*Physalodes Physalodes* (L.) Britton.]
Rare. Naturalized in Greece, *Bradley*. Hamlin, *M. S. Baxter*. Wayne county.

275. ATROPA L.

681. A. BELLADONNA L.
Rare. Naturalized in Parma, *Bradley*.

276. LYCIUM L.

682. L. VULGARE Dunal. [*L. vulgare* (Ait.f.) Dunal.] MATRIMONY VINE.
River banks and waste grounds; not uncommon.

277. HYOSCYAMUS Tourn. [L.]

683. H. NIGER L. HENBANE.
Rare. Waste place, *Mrs. Mary E. Streeter*.

278. DATURA L.

684. D. STRAMONIUM L. JAMESTOWN-WEED. THORN-APPLE.
Waste grounds; frequent.

685. D. TATULA L. PURPLE THORN-APPLE.
Rare. Near Clarissa street bridge, Rochester, *M. S. Baxter*. Hamlin, *Miss F. Beckwith*.

279. NICOTIANA Tourn. [L.]

686. N. RUSTICA L. WILD TOBACCO.
Rare. *L. Holzer*.

SCROPHULARIACEÆ.

280. VERBASCUM L.

687. V. THAPSUS L. COMMON MULLEIN.
Dry fields and roadsides; common.

688. V. BLATTARIA L. MOTH MULLEIN.
Fields, pastures and roadsides; frequent.

281. LINARIA Tourn. [Juss.]

689. **L. Canadensis** Dumont.
Rare. Mumford, *Mrs. N. G. Mathews*.

690. L. VULGARIS Mill. [*L. Linaria* (L.) Karst.] BUTTER AND EGGS.
Fields, roadsides, waste grounds; common.

282. DIGITALIS L.

691. D. LANATA L.
Escaped to roadside near Canandaigua, *Mrs. E. O. Cartwright*.

283. SCROPHULARIA Tourn. [L.]

692. **S. nodosa** L. var. **Marilandica** Gray. [*S. Marylandica* L.] FIGWORT.
River banks and ravines; frequent.

284. CHELONE Tourn. [L.]

693. **C. glabra** L. TURTLE-HEAD. SNAKE-HEAD.
Wet meadows, marshes and swamps; common.

285. PENTSTEMON Mitchell. [Soland.]

694. **P. pubescens** Solander. [*P. hirsutus* (L.) Willd.]
Dry or rocky ground. Common on the banks of Genesee river and in oak openings.

695. P. LÆVIGATUS Solander. [*P. Pentstemon* (L.) Britton.]
Rare. In a pasture, near woods, Penfield, *Rev. John Walton*.

696. P. LÆVIGATUS Solander, var. DIGITALIS Gray. (*P. Digitalis* Nuttall.) [*P. Digitalis* (Sweet) Nutt.]
Rare. Near Oak Orchard, Orleans county, *Prof. W. H. Lennon*. Wayne county, *E. L. Hankenson*.

286. MIMULUS L.

697. **M. ringens** L. MONKEY-FLOWER.
Wet meadows and along streams; frequent.

698. **M. alatus** Ait. [*M. alatus* Solander.]
Rare. Near Rochester, *L. Holzer*. Greece, *Bradley*.

287. GRATIOLA L.

699. **G. Virginiana** L. HEDGE-HYSSOP.
Muddy places, fields, and overflowed grounds; frequent.

288. ILYSANTHES Raf.

700. **I. riparia** Raf. (*I. gratioloides* Benth.) [*I. gratioloides* (L.) Benth.]
Rare. Brockport, *Prof. Lennon*. Kendall, Orleans county, *M. S. Baxter*. Sodus bay, Wayne county, *G. T. Fish*.

289. VERONICA L.

701. V. SPICATA L. Escaped. *G. T Fish*.

702. **V. Virginica** L. [*Leptandra Virginica* (L.) Nutt.] CULVER'S ROOT.
Rare. Rush, 1894, *Miss Beckwith*. Avon, Livingston Co., *Sartwell*.

703. **V. Anagallis** L. [*V. Anagallis-aquatica* L.] WATER SPEEDWELL.
Rare. Caledonia, Livingston county, *L. Holzer*. Roadside ditch near Bergen swamp. Kendall, Orleans county, *M S. Baxter*.

704. **V. Americana** Schweinitz. BROOK-LIME.
Brooks, ditches, marshes; common.

705. **V. scutellata** L. MARSH SPEEDWELL.
Wet meadows and swamps; frequent.

706. **V. officinalis** L. COMMON SPEEDWELL.
Dry woods, pastures, roadsides; frequent.

— V. CHAMÆDRYS L. Brockport, 1893, *Prof. Lennon*.

707. **V. serpyllifolia** L. THYME-LEAVED SPEEDWELL.
Fields and roadsides; common.

708. **V. peregrina** L. PURSLANE SPEEDWELL.
Waste and cultivated ground; common.

709. V. ARVENSIS L. CORN SPEEDWELL.
Cultivated grounds; common.

710. V. BUXBAUMII Tenore. [*V. Byzantina* (Sibth. & Smith) B.S.P.]
Rare. Gates, *G. T. Fish*. Perinton, *Miss Mary E. Macauley*.

290. BUCHNERA L. [BUECHNERA L.]

711. **B. Americana** L. [*Buechnera Americana* L.] BLUE-HEARTS.
Rare. Bank of Genesee river, Greece, *Bradley*.

291. GERARDIA L.

712. **G. pedicularia** L. [*Dasystoma pedicularia* (L.) Benth.]
Dry woods along the banks of Genesee river, near ravines, and on hills; frequent.

713. **G. flava** L. [*Dasystoma flava* (L.) Wood.] DOWNY FALSE FOXGLOVE.
Oak openings; common.

714. **G. quercifolia** Pursh. [*Dasystoma Virginica* (L.) Britton.] SMOOTH FALSE FOXGLOVE.
With *G. flava;* frequent.

715. **G. purpurea** L. PURPLE GERARDIA.
Rare. Shore of lake Ontario, Greece and Irondequoit, *Dr. Booth;* from Irondequoit bay eastward, *L. Holzer*. Mendon, *M. S. Baxter*.

716. **G. purpurea** L. var. **paupercula** Gray. [*G. paupercula* (A. Gray) Britton.]
Sphagnum bogs; rare. Border of Harris pond, Mendon, *Miss M. E. Macauley* and *Miss F. Beckwith*. Bergen swamp, *M. S. Baxter*.

717. **G. tenuifolia** Vahl. SLENDER GERARDIA.
In open woods, on low ground or on dry gravelly or sandy banks; frequent.

292. CASTILLEIA Mutis.

718. **C. coccinea** Spreng. [*C. coccinea* (L.) Spreng.] SCARLET PAINTED-CUP.
Formerly frequent on the sandy ridges about Irondequoit bay and creek; becoming scarce. Greece, *Bradley*. Scottsville. Maxwell's Station, Caledonia, Livingston county, *Miss F. Beckwith*.

293. PEDICULARIS Tourn. [L.]

719. **P. Canadensis** L. LOUSEWORT.
Woods, ravines and river banks; common.

720. **P. lanceolata** Michx.
Wet banks and marshy places; rare. Bank of Genesee river, near the paper-mill dam, *J. B. Fuller*. Ravine near Irondequoit bay, *Dr. C. M. Booth*. Irondequoit creek, *L. Holzer*. Caledonia, Livingston Co.

294. MELAMPYRUM Tourn. [L.]

721. **M. Americanum** Michx. [*M. lineare* Lam.] COW-WHEAT.
Dry woods; common.

OROBANCHACEÆ.

295. EPIPHEGUS Nutt.

722. **E. Virginiana** Bart. [*E. Virginiana* (L.) Bart.] BEECH-DROPS.
Frequent in beech woods.

296. CONOPHOLIS Wallroth.

723. **C. Americana** Wallr. [*C. Americana* (L. f.) A. Wallr.] CANCER-ROOT.
Rich woods; scarce. Irondequoit, *Dr. C. M. Booth*. Cobb's hill woods, Brighton. Dugway, Brighton. Greece, *J. B. Fuller*. Parma, *Bradley*. Sweden, *Prof. W. H. Lennon*. Wayne county.

297. APHYLLON Mitchell. [THALESIA Raf.]

724. **A. uniflorum** Gray. [*Thalesia uniflora* (L.) Britton.] ONE-FLOWERED CANCER-ROOT.
Moist woods and wooded banks; scarce. Glen Haven. Irondequoit. Brighton. Webster. Brockport. Adams Basin. Maxwell's Station, Livingston county. Wayne county.

LENTIBULARIACEÆ.

298. UTRICULARIA L.

725. **U. vulgaris** L. COMMON BLADDERWORT.
Common in shallow water in the lower Genesee and in all the bays and ponds opening into lake Ontario.

726. U. **gibba** L.
Rare. Mendon ponds, *G. T. Fish* and *J. B. Fuller*.

727. **U. intermedia** Hayne.
Rare. Wayne county, *E. L. Hankenson*.

728. **U. resupinata** B. D. Greene.
Rare. Muddy margin of Mendon ponds, *M. S. Baxter*.

729. **U. cornuta** Michx.
Rare. Shallow water at Mendon ponds, *G. T. Fish!* Wayne county.

299. PINGUICULA Tourn. [L.]

730. **P. vulgaris** L. BUTTERWORT.
Wet rocks below Genesee falls, *Dr. Dewey*, *Dr. Booth*. (Exhausted.) Mount Morris, Livingston county, *Mrs. Mary E. Streeter*.

ACANTHACEÆ.

300. DIANTHERA Gronov. [L.]

731. **D. Americana** L. WATER-WILLOW.
Rare. Eastern wide-water, Erie canal, *Otto Betz*. Wayne county.

VERBENACEÆ.

301. VERBENA Tourn. [L.]

732. **V. urticæfolia** L. WHITE VERVAIN.
Waste places, roadsides, pastures; common.

733. **V. hastata** L. BLUE VERVAIN.
Low grounds and roadsides; common.

302. PHRYMA L.

734. **P. Leptostachya** L. LOP-SEED.
Open woods, ravines, thickets; frequent.

LABIATÆ.

303. TEUCRIUM Tourn. [L.]

735. **T. Canadense** L. GERMANDER.
Low grounds, margins of streams, marshes; frequent.

304. COLLINSONIA L.

736. **C. Canadensis** L. HORSE-BALM.
Rich woods, shaded river banks and ravines; common.

305. MENTHA Tourn. [L.]

737. M. ROTUNDIFOLIA L. [*M. rotundifolia* (L.) Huds.]
Rare. Between Newark and Lyons, Wayne county, *E. L. Hankenson*.

738. M. VIRIDIS L. [*M. spicata* L.] SPEARMINT.
Brooksides and roadsides; common.

739. M. PIPERITA L. PEPPERMINT.
Brooks, ditches, springy places, etc.; common.

740. M. CITRATA Ehrh. BERGAMOT MINT.
Lumber yard, East Rochester, *J. B. Fuller*.

— M. SATIVA L. WHORLED MINT.
Waste lot, Central avenue, Rochester, *J. B. Fuller*.

741. **M. Canadensis** L. WILD MINT.
Low ground and along streams; common.

306. LYCOPUS Tourn. [L.]

742. **L. Virginicus** L. BUGLE-WEED.
Shaded low grounds and moist banks; common.

743. **L. sinuatus** Ell. (*Lycopus Europæus* var. *sinuatus* Gray.)
Wet places; very common.

307. HYSSOPUS Tourn. [L.]

744. H. OFFICINALIS L. HYSSOP.
Monroe avenue, near Pinnacle hill, Rochester, *Miss F. Beckwith*. Roadside, Gates, *G. T. Fish*. Penfield, *L. Holzer*.

308. PYCNANTHEMUM Michx. [KŒLLIA Mœnch.]

745. **P. lanceolatum** Pursh. [*Kœllia Virginiana* (L.) Britton.]
Rare. Greece, *Bradley*. Near Canandaigua lake, *Mrs. Geo. E. King*.

746. **P. muticum** Pers. [*Kœllia mutica* (Michx.) Britton.]
Rare. Brighton, *L. Holzer*. Near Rochester, *Dr. C. M. Booth*. Mendon, *Geo. T. Fish!*

747. **P. incanum** Michx.
Not common. Dry woods around Irondequoit bay. Greece, *Bradley*.

309. ORIGANUM Tourn. [L.]

748. O. VULGARE L. WILD MARJORAM.
Roadside, Clyde, Wayne county, *E. L. Hankenson*.

310. THYMUS Tourn. [L.]

749. T. SERPYLLUM L. WILD THYME.
Roadside, *L. Holzer*.

—— T. VULGARIS L. COMMON THYME.
Escaped. *G. T. Fish.*

SATUREIA Tourn. [L.]

—— S. HORTENSIS L. SUMMER SAVORY. Escaped.

311. CALAMINTHA Tourn. [CLINOPODIUM L.]

750. C. NEPETA Link. [*Clinopodium Nepeta* (L.) Kuntze.] BASIL THYME.
Rochester, *Dr. C. M. Booth.*

751. **C. Clinopodium** Benth. [*Clinopodium vulgare* L.] BASIL.
Copses, fields, pastures, roadsides; common.

312. MELISSA L.

752. M. OFFICINALIS L. COMMON BALM.
Roadsides; scarce.

313. HEDEOMA Pers.

753. **H. pulegioides** Pers. [*H. pulegioides* (L.) Pers.] PENNYROYAL.
Dry open woods and fields; common.

314. MONARDA L.

754. **M. didyma** L. BEE BALM.
Rare. Low ground along Irondequoit creek, *Dr. C. M. Booth. L. Holzer.* Wayne county.

755. **M. Clinopodia** L.
Rare. Ravine near foot of Lorimer street, Rochester, *J. B. Fuller. Mary E. Macauley.*

756. **M. fistulosa** L. var. **rubra** Gray. [*M. media* Willd.]
Scarce. Shores of Irondequoit bay.

757. **M. fistulosa** L. var. **mollis** Benth. [*M. fistulosa* L.] WILD BERGAMOT.
Dry woods, river banks, ravines; common.

315. BLEPHILIA Raf.

758. **B. ciliata** Raf. [*B. ciliata* (L.) Raf.]
Rare. Canandaigua, *E. J. Durand.*

316. LOPHANTHUS Benth. [VLECKIA Raf.]

759. **L. nepetoides** Benth. [*Vleckia nepetoides* (L.) Raf.] GIANT HYSSOP.
Rare. Bank of Genesee river, *Geo. T. Fish.* Le Roy, *Mrs. S. T. Howard.* Wayne county.

317. NEPETA L.

760. N. CATARIA L. CATNIP.
Fields, roadsides, waste places; common.

761. N. GLECHOMA Benth. [*Glechoma hederacea* L.] GROUND IVY. GILL-OVER-THE-GROUND.
Waste places and roadsides; common.

318. SCUTELLARIA L.

762. **S. lateriflora** L. MAD-DOG SKULL-CAP.
Low grounds and river banks; common.

763. **S. parvula** Michx.
Rare. Sodus bay, *G. T. Fish*. Wayne county, *E. L. Hankenson*.

764. **S. galericulata** L.
Borders of streams and marshes; frequent.

319. BRUNELLA Tourn. [PRUNELLA L.]

765. **B. vulgaris** L. [*Prunella vulgaris* L.] HEAL-ALL.
Woods, meadows, roadsides; common.
A form with pink flowers was found at the Dugway by *Miss Beckwith*. White flowers, in Irondequoit, by *Warner W. Gilbert*.

320. MARRUBIUM Tourn. [L.]

766. M. VULGARE L. HOREHOUND.
Fields and waste places; infrequent.

PHLOMIS Tourn. [L.]

— P. TUBEROSA L. JERUSALEM SAGE.
Shore of lake Ontario. Introduced and somewhat naturalized, *Chester Dewey in Herb. Sartwell, Ham. Coll.*

321. LEONURUS L.

767. L. CARDIACA L. MOTHERWORT.
Fields, waste places, and roadsides; common.

322. LAMIUM L.

768. L. AMPLEXICAULE L. DEAD-NETTLE.
Fields; infrequent. Abundant in some places.

769. L. ALBUM. Escaped. *Prof. W. H. Lennon*.

323. GALEOPSIS L.

770. G. TETRAHIT L. HEMP-NETTLE.
River banks and waste places; scarce.

324. STACHYS Tourn. [L.]

771. **S. palustris** L.
Along the lower Genesee; scarce.

772. **S. aspera** Michx. (*S. palustris* L. var. *aspera* Gray.)
Shores and wet grounds; frequent.

773. S. LANATA Jacq.
Escaped. Henrietta, *J. B. Fuller*. Mendon, *Geo. T. Fish*.

PLANTAGINACEÆ.

325. PLANTAGO Tourn. [L.]

774. P. MAJOR L. COMMON PLANTAIN.
Fields, roadsides, waste places; frequent.

775. **P. Rugelii** Decaisne.
Fields, dooryards, roadsides, waste places; our most common species.

776. P. LANCEOLATA L. RIBWORT.
Fields, roadsides, dooryards; very common.

AMARANTACEÆ. [AMARANTHACEÆ.]

326. AMARANTUS Tourn. [AMARANTHUS L.]

777. A. HYPOCHONDRIACUS L. [*Amaranthus hybridus* L.]
Rare. Wayne county, *E. L. Hankenson*.

778. A. PANICULATUS L. [*Amaranthus hybridus paniculatus* (L.) Uline & Bray.]
Roadsides; rare. *Geo. T. Fish. Prof. W. H. Lennon*.

779. A. RETROFLEXUS L. [*Amaranthus retroflexus* L.]
Fields, roadsides, waste places; common.

780. A. ALBUS L. [*Amaranthus græcizans* L.] TUMBLE-WEED.
Fields, roadsides, waste places; common.

781. A. BLITOIDES Watson. [*Amaranthus blitoides* S. Watson.]
Central avenue, Rochester, 1885, *Otto Betz*. Goodman street, near the axle-works, 1891, *J. B. Fuller*.

CHENOPODIACEÆ.

327. CHENOPODIUM Tourn. [L.]

782. C. ALBUM L. PIG-WEED.
Fields, gardens, waste grounds; very common.

783. C. URBICUM L. var. RHOMBIFOLIUM. [*C. urbicum* L.]
Rare. Rochester, 1864, *D. F. Day, in 18th N. Y. Rep.; G. T. Fish.*

784. **C. hybridum** L. MAPLE-LEAVED GOOSE-FOOT.
Waste places and river banks; frequent.

785. C. BONUS-HENRICUS L. MERCURY.
Escaped. Reilly lot, Central avenue, Rochester, *Joseph B. Fuller*. Newark, Wayne county, *E. L. Hankenson*.

786. **C. capitatum** Watson. (*Blitum capitatum* L.) [*Blitum capitatum* L.] STRAWBERRY BLITE.
Fields; scarce.

787. C. BOTRYS L. JERUSALEM OAK.
Waysides and waste places; infrequent.

328. ATRIPLEX Tourn. [L.]

788. **A. patulum** L. var. **hastatum** Gray. [*A. hastata* L.]
Streets and waste places; frequent.

PHYTOLACCACEÆ.

329. PHYTOLACCA Tourn. [L.]

789. **P. decandra** L. COMMON POKE-WEED. SCOKE-BERRY. GARGET.
Pastures and borders of woods; frequent.

POLYGONACEÆ.

330. RUMEX L.

790. **R. Britannica** L. (*R. orbiculatus* Man.) GREAT WATER-DOCK.
Marshes; frequent.

791. **R. verticillatus** L. SWAMP DOCK.
Marshes; common.

792. R. CRISPUS L. CURLED DOCK.
Fields and waste places; common.

793. R. OBTUSIFOLIUS L. BITTER DOCK.
Fields, roadsides, waste places; common.

794. **R. crispus** L. × **R. obtusifolius** L.
Reilly lot, Central avenue, Rochester.

795. R. SANGUINEUS L.
Rare. *Prof. W. H. Lennon.*

796. R. ACETOSELLA L. SHEEP-SORREL.
Fields; common. Abundant in poor, sandy soils.

331. POLYGONUM Tourn. [L.]

797. **P. aviculare** L. KNOT-GRASS.
Common in door-yards, streets, waste places, and along foot-paths.

798. **P. erectum** L. (*P. aviculare* L. var. *erectum* Roth.)
Waysides and waste places; common.

799. **P. lapathifolium** L. var. **incarnatum** Watson. (*P. incarnatum* Ell.) [*P. incarnatum* Ell.]
Marshes; not common. Frequent in the marshes around Irondequoit bay, Round pond, Long pond, etc.

800. **P. Pennsylvanicum** L.
In moist rich soil, brooksides, marshes, etc.; common.

801. **P. amphibium** L.
Aquatic; rare. Kendall, Orleans county, *M. S. Baxter.*

802. **P. Muhlenbergii** Watson. (*Polygonum amphibium* var. *terrestre* Gray.) [*P. emersum* (Michx.) Britton.]
Muddy shores; not common. Irondequoit bay and other bays and ponds.

803. **P. Hartwrightii** Gray. [*P. Hartwrightii* A. Gray.]
Rare. Wayne county, *E. L. Hankenson.*

804. P. ORIENTALE L. PRINCE'S FEATHER.
Waste places; infrequent.

805. P. PERSICARIA L. LADY'S THUMB.
Everywhere common.

806. **P. hydropiperoides** Michx. MILD WATER-PEPPER.
Wet places, marshes; infrequent.

807. **P. Hydropiper** L. SMART-WEED.
Fields, ditches and wet places; common.

808. **P. acre** HBK. [*P. punctatum* Ell.] WATER SMART-WEED.
Shores, marshes, ditches; frequent.

809. **P. Virginianum** L.
Rich woods and along streams; infrequent.

810. **P. arifolium** L. HALBERD-LEAVED TEAR-THUMB.
Low grounds, marshes; infrequent.

811. **P. sagittatum** L. ARROW-LEAVED TEAR-THUMB.
Low grounds and marshes; common. A form with peduncles armed with fine saw-toothed prickles is frequent.

812. P. CONVOLVULUS L. BLACK BIND-WEED.
Cultivated and waste grounds; common.

813. **P. cilinode** Michx.
Rare. Sodus bay, *G. T. Fish, E. L. Hankenson*.

814. **P. dumetorum** L. CLIMBING FALSE-BUCKWHEAT.
Marshes; frequent.

815. **P. dumetorum** L. var. **scandens** Gray. [*P. scandens* L.]
Marshes and banks of streams; frequent.

332. FAGOPYRUM Tourn. [Gærtn.]

816. F. ESCULENTUM Mœnch. [*F. Fagopyrum* (L.) Karst.] BUCKWHEAT.
Borders of fields; frequent.

333. POLYGONELLA Michx.

817. **P. articulata** Meisner. (*Polygonum articulatum* Gray.) [*Polygonella articulata* (L.) Meisner.]
Rare. Oak openings at Charlotte, *Bradley*.

ARISTOLOCHIACEÆ.

334. ASARUM Tourn. [L.]

818. **A. Canadense** L. WILD GINGER.
Sides of ravines and in rich woods; frequent.

PIPERACEÆ. [SAURURACEÆ.]

335. SAURURUS L.

819. **S. cernuus** L. LIZARD'S-TAIL.
Swamps and borders of marshes; frequent.

LAURACEÆ.

336. SASSAFRAS Nees. [Nees & Eberm.]

820. **S. officinale** Nees. [*S. Sassafras* (L.) Karst.] SASSAFRAS.
Rich woods, river banks, sides of ravines, hills; common.

337. LINDERA Thunb. [BENZOIN Fabric.]

821. **L. Benzoin** Blume. [*Benzoin Benzoin* (L.) Coulter.] SPICE BUSH.
Damp copses, marshes; frequent.

THYMELÆACEÆ.

338. DIRCA L.

822. **D. palustris** L. LEATHER-WOOD.
Rich woods, river banks, ravine sides; infrequent.

339. DAPHNE L.

823. D. MEZEREUM L.
Introduced; rare. Woods in Seneca park, *H. B. Brown*. Mt. Read, Greece, *R. J. Fleming*.

ELÆAGNACEÆ.

340. SHEPHERDIA Nutt. [LEPARGYRÆA Raf.]

824. **S. Canadensis** Nutt. [*Lepargyræa Canadensis* (L.) Greene.]
Frequent on the banks of Genesee river, Pinnacle hills, and shores of Irondequoit bay. Banks of Oak Orchard creek, Kendall, Orleans Co.

LORANTHACEÆ.

341. ARCEUTHOBIUM Bieb.

825. **A. pusillum** Peck. [*Razoumofskya pusilla* (Peck) Kuntze.]
Rare. Mendon, 1894, *M. S. Baxter.*

SANTALACEÆ.

342. COMANDRA Nutt.

826. **C. umbellata** Nutt. [*C. umbellata* (L.) Nutt.]
Common on the dry banks of Genesee river, Oak Orchard creek, Canandaigua lake, etc., with *Ceanothus* and *Shepherdia*.

EUPHORBIACEÆ.

343. EUPHORBIA L.

827. **E. polygonifolia** L.
Frequent on the sandy shore of lake Ontario.

828. **E maculata** L.
Fields, roadsides, waste places; common.

829. **E. Preslii** Guss. (*E. hypericifolia* Man., not L.) [*E. nutans* Lag.]
Fields and hillsides, in dry soil; common.

830. **E. corollata** L. FLOWERING SPURGE.
Rare. Brockport, *Prof. Lennon*. Mount Morris, *Mrs. M. E. Strecter.*

831. E. HELIOSCOPIA L.
Rare. *G. T. Fish*. Wayne county.

832. E. CYPARISSIAS L. CYPRESS SPURGE.
Roadsides, in sand or gravel; infrequent.

833. E. PEPLUS L.
Frequent in the streets of Rochester. Wayne county.

— E. LATHYRIS L.
Roadside, Brighton, *Dr. C. M. Booth*. *L. Holzer.*

344. ACALYPHA L.

834. **A. Virginica** L.
Moist ground in fields and by roadsides; common.

URTICACEÆ.

345. ULMUS L.

835. **U. fulva** Michx. [*U. pubescens* Walt.] SLIPPERY ELM. RED ELM.
River banks and ravines; frequent.

836. **U. Americana** L. WHITE ELM.
Low woods; common. The form catalogued by nurserymen as the American Weeping Elm is frequent.

837. **U. racemosa** Thomas. CORKY ELM.
Low rich grounds; rare. Three specimens on the flats along Irondequoit creek, Brighton. Henrietta, *M. S. Baxter*. Brockport, *Prof. W. H. Lennon*. Wayne county.

346. CELTIS Tourn. [L.]

838. **C. occidentalis** L. HACKBERRY.
Scarce. River flats, near Vincent st. bridge, Rochester, *C. C. Laney*. East shore of Irondequoit bay, Webster, *G. T. Fish*. Rush, *R. O. Greene!* Wayne county.

347. CANNABIS Tourn. [L.]

839. C. SATIVA L. HEMP.
Waste places; infrequent.

348. HUMULUS L.

840. H. LUPULUS L. COMMON HOP.
Infrequent. Not known to be indigenous.

349. MORUS Tourn. [L.]

841. **M. rubra** L. RED MULBERRY.
Rich woods and ravines; scarce.

842. M. ALBA L. WHITE MULBERRY.
River banks, hillsides, waysides; scarce.

350. URTICA Tourn. [L.] NETTLE.

843. **U. gracilis** Ait.
Low places, fence rows, banks of streams; common.

844. U. DIOICA L.
Rare. *Prof. Lennon*. Wayne county.

—— U. CHAMÆDRYOIDES Pursh. Introduced. *Dr. C. M. Booth*.

351. LAPORTEA Gaud. [URTICASTRUM Fabric.]

845. **L. Canadensis** Gaudichaud. [*Urticastrum divaricatum* (L.) Kuntze.]
Moist rich woods and ravines; frequent.

352. PILEA Lindl. [ADICEA Raf.]

846. **P. pumila** Gray. [*Adicea pumila* (L.) Raf.] RICH-WEED.
Moist shaded soil, springy places, and in shallow clear water; common.

353. BŒHMERIA Jacq.

847. **B. cylindrica** Willd. [*B. cylindrica* (L.) Willd.] FALSE NETTLE.
Moist shaded soil and marshes; frequent.

PLATANACEÆ.

354. PLATANUS L.

848. **P. occidentalis** L. SYCAMORE. BUTTON-WOOD.
Woods and banks of streams; infrequent.

JUGLANDACEÆ.

355. JUGLANS L.

849. **J. cinerea** L. BUTTERNUT.
Rich woods, river banks and ravines; frequent.

850. J. NIGRA L. BLACK WALNUT.
Fields and roadsides; scarce.

356. CARYA Nutt. [HICORIA Raf.]

851. **C. alba** Nutt. [*Hicoria ovata* (Mill.) Britton.] SHAGBARK HICKORY.
Woods; common.

852 **C. sulcata** Nutt. [*Hicoria laciniosa* (Michx. f.) Sargent.]
Rare. Rush, *E. P. Clapp;* also on the Budlong farm! Caledonia, Livingston county, *C. C. Laney* and *John Dunbar*. Wayne county.

853. **C. tomentosa** Nutt. [*Hicoria alba* (L.) Britton.]
Rare. Mendon, *G. T. Fish*.

854. **C. microcarpa** Nutt. [*Hicoria microcarpa* (Nutt.) Britton.]
Not common.

855. **C. porcina** Nutt. [*Hicoria glabra* (Mill.) Britton.] PIG-NUT.
Dry banks and upland woods; common.

856. **C. amara** Nutt. [*Hicoria minima* (Marsh.) Britton.] BITTER-NUT.
River banks, sides of ravines, low woods, along streams; common.

MYRICACEÆ.

357. MYRICA L.

857. **M. Gale** L. SWEET GALE.
Rare. Wayne county, *E. L. Hankenson*.

858. **M. cerifera** L. (in part.) [*M. Carolinensis* Mill.] BAY-BERRY.
Swamps and their borders. Rochester, *Dewey*. Seneca park, east side, a single plant, *C. C. Laney!* formerly abundant there, *Dr. C. M. Booth*. Parma, *Bradley*. Near Scottsville and Caledonia, *Miss F. Beckwith*. Adams Basin, *M. S. Baxter*. Abundant in Bergen swamp. Wayne county.

CUPULIFERÆ.

358. BETULA Tourn. [L.]

859. **B. lenta** L. BLACK BIRCH.
Woods, river banks and ravines; frequent.

860. **B. lutea** Michx. YELLOW BIRCH.
Rich moist woods and ravines; frequent.

861. **B. populifolia** Ait. (*B. alba* var. *populifolia* Spach.) [*B. populifolia* Marsh.] AMERICAN WHITE BIRCH.
Rare. Near Brockport, *Prof. Lennon*.

862. **B. papyrifera** Marsh. (*B. papyracea* Ait.) PAPER OR CANOE BIRCH.
Infrequent. Webster, near the lake shore. Wayne county.

863. **B. pumila** L. DWARF BIRCH.
Rare. Tonawanda swamp, near Albion, *Dr. C. M. Booth*.

359. ALNUS Tourn. [Gærtn.]

864. **A. incana** Willd. [*A. incana* (L.) Willd.] SPECKLED ALDER.
Borders of streams and swamps; common.

865. **A. serrulata** Willd. [*A. rugosa* (Ehrh.) Koch.] SMOOTH ALDER.
Rare. *L. Holzer*.

360. CORYLUS Tourn. [L.]

866. **C. Americana** Walt. WILD HAZEL-NUT.
Not common. Frequent on the high land between Bushnell's Basin and Fisher's Station, *M. S. Baxter.*

867. **C. rostrata** Ait. BEAKED HAZEL-NUT.
Hillsides, river banks and ravines; frequent.

361. OSTRYA Micheli. [Scop.]

868. **O. Virginica** Willd. [*O. Virginiana* (Mill.) Willd.] HOP-HORNBEAM. IRON-WOOD.
Woods, river banks and ravines; common.

362. CARPINUS L.

869. **C. Caroliniana** Walt. (*C. Americana* Michx.) HORNBEAM. BLUE or WATER BEECH. IRON-WOOD.
Swampy woods, river banks and ravine sides; common.

363. QUERCUS L.

870. Q. ROBUR L. var. PEDUNCULATA. ENGLISH OAK.
Abandoned nursery grounds, Prince street, Rochester. Occasionally planted.

871. **Q. alba** L. WHITE OAK.
Woods; common.

872. **Q. macrocarpa** Michx. BUR OAK.
Low grounds; infrequent.

873. **Q. bicolor** Willd. [*Q. platanoides* (Lam.) Sudw.] SWAMP WHITE OAK.
Low grounds; frequent.

874. **Q. Prinus** L. ROCK OAK. CHESTNUT OAK.
Banks of Genesee river, ravines and hillsides; infrequent.

875. **Q. Muhlenbergii** Engelmann. (*Q. Prinus* L. var. *acuminata* Michaux.) YELLOW OAK. CHESTNUT OAK.
Rare. Bank of Genesee river, Seneca park, west side. Wayne Co.

876. **Q. prinoides** Willd.
Rare. Bank of Genesee river, near the upper landing, *Dr. C. M. Booth.*

877. **Q. rubra** L. RED OAK.
Dry woods, hills and river banks; common.

878. **Q. coccinea** Wang. SCARLET OAK.
Dry hills and river banks; scarce. Seneca park and Genesee Valley park, Rochester. Oak Orchard creek, Kendall, Orl. Co. Wayne Co.

879. **Q. coccinea** Wang. var. **tinctoria** Gray. (*Q. tinctoria* Bartram.) [*Q. velutina* Lam.] BLACK OAK. YELLOW OAK. QUERCITRON OAK.
Dry woods on hills and river banks; common.

880. **Q. ilicifolia** Wang. BLACK SCRUB OAK. *Rev. L. Holzer.*

364. CASTANEA Tourn. [Adans.]

—— C. SATIVA Mill. EUROPEAN CHESTNUT.
Abandoned nursery grounds, Prince street, Rochester.

881. **C. sativa** Mill. var. **Americana** Wats. & Coult. (*C. vesca* var. of Man.) [*C. dentata* (Marsh.) Sudw.] AMERICAN CHESTNUT.
Woods, hills, river banks, sides of ravines; common.

365. FAGUS Tourn. [L.]

882. **F. ferruginea** Ait. [*F. atropunicea* (Marsh.) Sudw.] AMERICAN BEECH.
Woods; common.

— F. SYLVATICA L. EUROPEAN BEECH.
Abandoned nursery grounds, Prince street, Rochester.

SALICACEÆ.

366. SALIX Tourn. [L.]

883. **S. nigra** Marsh. BLACK WILLOW.
Banks of streams, shores, etc.; common.

884. **S. amygdaloides** Anders. PEACH WILLOW.
Low grounds and along streams; more abundant than the preceding.

885. **S. lucida** Muhl. SHINING WILLOW.
Low grounds, along streams and shores; frequent. Occasional on dry and rocky banks of the lower Genesee.

886. **S. lucida** Muhl. var. ——— ?
In Bergen swamp. Flowers June 10–30; fruit last of Aug. to Sept.

887. S. FRAGILIS L. BRITTLE WILLOW.
Reported by *Rev. L. Holzer*. Probably one of the many hybrids between *S. fragilis* and *S. alba*.

888. S. ALBA L. var. VITELLINA Koch. [*S alba vitellina* (L.) Koch.]
Common along streams and embankments.

889. **S. alba** L. var. **vitellina** Koch. × **S. lucida** Muhl. (?)
River flats, Hanford's Landing, *J. B. Fuller*. Tree 35 feet in height; catkins, color of twigs, bark and habit of plant are like *S. alba-vitellina*, while the leaves resemble closely those of *S. lucida*.

890. S. BABYLONICA Tourn. [*S. Babylonica* L.] WEEPING WILLOW.
Escaped; occasional.

891. **S. longifolia** Muhl. LONG-LEAVED WILLOW.
In alluvial soil; infrequent. Shore of Red creek near confluence with Genesee river. Margin of Genesee river near the upper falls. Bank of Genesee river and shore of lake Ontario near Sea Breeze, *E. L. Hankenson*. Sodus point, Wayne county.

892. **S. rostrata** Richardson.
Frequent in ravines and on the borders of marshes; often on dry hillsides.

893. S. CAPREA L. GOAT WILLOW.
Abandoned nursery grounds, Prince street, Rochester.

894. **S. discolor** Muhl. GLAUCOUS WILLOW.
Wet or dry places; common.

895. **S. humilis** Marsh. PRAIRIE WILLOW.
Dry river banks, hills, and ravine sides; common.

896. **S. humilis** Marsh. × **S. discolor** Muhl. (?)
Dry bank of Genesee river. Twenty plants in one group.

897. **S. sericea** Marsh. SILKY WILLOW.
Wayne county, *E. L. Hankenson*.

898. **S. petiolaris** J. E. Smith.
Monroe county, *Dr. C. Dewey*. Wayne county, *E. L. Hankenson*.

899. **S. candida** Willd. [*S. candida* Flügge.] HOARY WILLOW.
Cold swamps and sphagnum marshes; scarce. Marsh at head of Irondequoit bay, *Dr. C. M. Booth!* Riga, *Miss F. Beckwith*. Adams Basin, *M. S. Baxter*. Mendon, *G. T. Fish*. Caledonia, Livingston county, *Clinton*. Bergen swamp, Genesee county. Wayne county.

900. S. PURPUREA L. PURPLE WILLOW.
Low grounds and along streams; common.

901. **S. cordata** Muhl. HEART-LEAVED WILLOW.
In springy places on rocky river banks, ravine sides, low grounds and along streams; very common.

902. **S. cordata** Muhl. × **S. sericea** Marsh. (*S. myricoides* Muhl.)
Reported only by *G. T. Fish*.

903. **S. myrtilloides** L. MYRTLE WILLOW.
Rare. Mendon, *G. T. Fish*, *M. S. Baxter*, 1895. Wayne county.

367. POPULUS Tourn. [L.]

904. P. ALBA L. WHITE POPLAR. ABELE.
Roadsides; occasional. Produced by suckers from the roots of planted trees.

905. **P. tremuloides** Michx. AMERICAN ASPEN.
River banks, ravines, hillsides; common.

906. **P. grandidentata** Michx. LARGE-TOOTHED ASPEN.
Dry woods, river banks and hills; common.

907. **P. balsamifera** L. BALSAM POPLAR.
Near the lake, in the town of Greece. Border of Bergen swamp.

— P. BALSAMIFERA L. var. CANDICANS Gray. [*P. balsamifera candicans* (Ait.) A. Gray.] BALM OF GILEAD.
Occasionally planted along roadsides.

908. **P. monilifera** Ait. COTTON WOOD.
Frequent along the banks of the Genesee river and about Irondequoit bay; common along the shore of lake Ontario. Wayne county.

909. P. DILATATA Ait. [*P. nigra* L.] LOMBARDY POPLAR.
Bank of Genesee river, Greece. Frequently planted along roadsides.

CERATOPHYLLACEÆ.

368. CERATOPHYLLUM L.

910. **C. demersum** L. HORNWORT.
Frequent in all our bays and ponds.

MONOCOTYLEDONES.

HYDROCHARIDACEÆ. [HYDROCHARITACEÆ.]

369. ELODEA Michx. [UDORA Nutt.]

911. **E. Canadensis** Michx. (*Anacharis Canadensis* Planchon.) [*Udora Canadensis* (Michx.) Nutt.] WATER-WEED.
Bays, ponds and slow streams; common.

370. VALLISNERIA L.

912. **V. spiralis** L. EEL-GRASS.
Common in all our bays and ponds along lake Ontario, and in the Erie canal.

371. LIMNOBIUM L. C. Richard.

913. **L. Spongia** L. C. Richard. AMERICAN FROG'S-BIT.
Braddock's bay, *Bradley*. Has not been seen for several years.

ORCHIDACEÆ.

372. MICROSTYLIS Nutt. [ACHROANTHES Raf.]

914. **M. monophyllos** Lindl. [*Achroanthes monophylla* (L.) Greene.]
Rare. Border of Bergen swamp, *John E. Paine*. Wayne county.

373. LIPARIS Richard. [LEPTORCHIS Du Petit Thouars.]

915. **L. liliifolia** Richard. [*Leptorchis liliifolia* (L.) Kuntze.]
Rich moist woods; infrequent. Greece, *Dr. Anna H. Searing*. Brighton, *G. T. Fish*. Penfield, *M. S. Baxter*.

916. **L. Læselii** Richard. [*Leptorchis Læselii* (L.) MacM.]
Swamps and marshes; scarce. Irondequoit bay, *G. T. Fish*. Adams Basin, *Prof. W. H. Lennon*. Mendon, *G. T. Fish* and *M. S. Baxter*. West bank of Genesee river, below Rochester, and Fisher's Station, Ontario county, *M. S. Baxter*. Bergen swamp, *Dr. C. M. Booth!*

374. CALYPSO Salisb.

917. **C. borealis** Salisb. [*C. bulbosa* (L.) Oakes.]
Local. Hemlock woods bordering Bergen swamp. Discovered by *Dr. C. M. Booth* in 1863. There were about forty plants at the station when visited last by Dr. Booth and Mr. Fuller.

375. TIPULARIA Nutt.

918. **T. discolor** Nutt. [*T. unifolia* (Muhl.) B.S.P.] CRANE-FLY ORCHIS.
Rare. Parma, *Bradley*. Adams Basin, *M. S. Baxter*. *Prof. Lennon*.

376. APLECTRUM Nutt.

919. **A. hiemale** Nutt. [*A. spicatum* (Walt.) B. S. P.] ADAM AND EVE. PUTTY-ROOT.
Damp woods, in rich soil; rare. Gates, *J. B. Fuller*. Penfield, *Dr. C. M. Booth*. Adams Basin, *M. S. Baxter*. Troutburg, *Prof. W. H. Lennon*. Macedon, Wayne county, *E. L. Hankenson*.

377. CORALLORHIZA Haller. [R. Br.]

920. **C. innata** R. Brown. [*C. Corallorhiza* (L.) Karst.]
Rare. Damp woods bordering Bergen swamp.

921. **C. odontorhiza** Nutt. [*C. odontorhiza* (Willd.) Nutt.]
Rare. Shore of Irondequoit bay, *G. T. Fish*.

922. **C. multiflora** Nutt.
Dry woods; common.

923. **C. striata** Lindl. (*C. Macræi* Gray.)
Rare. Troutburg, *Prof. W. H. Lennon* and *M. S. Baxter*.

378. LISTERA R. Br.

924. **L. cordata** R. Br. [*L. cordata* (L.) R. Br.] TWAYBLADE.
Rare. Bergen swamp, in wet moss.

379. SPIRANTHES Richard. [GYROSTACHYS Pers.] LADIES' TRESSES.

925. **S. latifolia** Torr. [*Gyrostachys latifolia* (Torr.) Kuntze.]
Rare. Near Rochester, *Dr. C. M. Booth*. Charlotte, *J. B. Fuller*. Adams Basin, *M. S. Baxter*. Wayne county.

926. **S. Romanzoffiana** Cham. [*Gyrostachys Romanzoffiana* (Cham.) MacM.]
Rare. Bergen swamp, *G. T. Fish*, *Prof. W. H. Lennon*, *M. S. Baxter*. Wayne county.

927. **S. cernua** Richard. [*Gyrostachys cernua* (L.) Kuntze.]
Marshes and wet meadows; abundant.

928. **S. gracilis** Bigel. [*Gyrostachys gracilis* (Bigel.) Kuntze.]
Hillsides and dry woods; frequent.

380. GOODYERA R. Br. [PERAMIUM Salisb.]

929. **G. repens** R. Br. [*Peramium repens* (L.) Salisb.]
Rare. In cold woods bordering Bergen swamp. Wayne county.

930. **G. pubescens** R. Brown. [*Peramium pubescens* (Willd.) C. C. Curtiss.]
RATTLESNAKE PLANTAIN.
In rich woods; scarce.

381. EPIPACTIS Haller. [R. Br.]

931. **E. Helleborine** Gray, Man., not Crantz. [*E. viridiflora* (Hoffm.) Reichb.]
Rare. Near Rochester, 1894, *M. S. Baxter*. Canandaigua, July 22, 1881, *Canandaigua Botanical Club*.

382. ARETHUSA Gronov. [L.]

932. **A. bulbosa** L.
Rare. Bergen swamp, Genesee county. Wayne county.

383. CALOPOGON R. Br. [LIMODORUM L.]

933. **C. pulchellus** R. Br. [*Limodorum tuberosum* L.]
Sphagnum swamps. West of Fairport. Mendon. Adams Basin. Frequent in Bergen swamp, where white flowers also occur. Wayne county. Ontario county.

384. POGONIA Juss.

934. **P. ophioglossoides** Nutt. [*P. ophioglossoides* (L.) Ker.]
Sphagnum swamps, with *Calopogon pulchellus*. Mendon. Bergen. Wayne county.

935. **P. pendula** Lindl. [*P. trianthophora* (Sw.) B.S.P.]
Rare. Woods east of Windsor beach, Irondequoit, *Miss Mary E. Macauley*. Gates, *Miss F. Beckwith*. Parma, *Bradley*. Webster and Adams Basin, *M. S. Baxter*. Brockport, *Prof. Lennon*. Wayne Co.

385. ORCHIS L.

936. **O. spectabilis** L. SHOWY ORCHIS.
Rich moist woods; frequent.

386. HABENARIA Willd.

937. **H. tridentata** Hook. [*H. clavellata* (Michx.) Spreng.]
Shady swamps; rare. *Mrs. Mary E. Streeter*. Adams Basin, *M. S. Baxter*. Wayne county.

938. **H. virescens** Spreng. [*H. flava* (L.) A. Gray.]
Wet places; frequent.

939. **H. bracteata** R. Br. (*H. viridis* var. *bracteata* Reichenb.) [*H. bracteata* (Willd.) R. Br.]
Damp woods; scarce. Brighton, *Dr. C. M. Booth*. Near Coldwater, *G. T. Fish*. Troutburg, *M. S. Baxter*. Bergen, Genesee county.

940. **H. hyperborea** R. Br. [*H. hyperborea* (L.) R. Br.]
Cold swamps and marshy places; frequent.

941. **H. dilatata** Gray. [*H. dilatata* (Pursh) Hook.]
Scarce. Bergen swamp, Genesee county.

942. **H. Hookeri** Torr. [*H. Hookeriana* A. Gray.]
Damp rich woods; not uncommon. Gates. Greece. Irondequoit. Penfield. Perinton. Mendon. Rush. Troutburg. Bergen, Genesee county. Wayne county. Var. *oblongifolia* Paine occurs in the town of Penfield, *M. S. Baxter*.

943. **H. orbiculata** Torr. [*H. orbiculata* (Pursh) Torr.]
Rich damp woods; rare. Bergen, Genesee county, *Prof. W. H. Lennon*. Ontario, Wayne county, *G. T. Fish*. *E. L. Hankenson*.

944. **H. ciliaris** R. Br. [*H. ciliaris* (L.) R. Br.] YELLOW FRINGED ORCHIS.
Rare. On an island in Irondequoit bay, *J. B. Fuller*. Woods north of the Ridge road, *Robert Bunker*.

945. **H. blephariglottis** Torr. [*H. blephariglottis* (Willd.) Torr.] WHITE FRINGED ORCHIS.
Rare. Mendon, *M. S. Baxter*. Wayne county.

946. **H. leucophæa** Gray. [*H. leucophæa* (Nutt.) A. Gray.]
Rare. Wayne county, *E. L. Hankenson*.

947. **H. lacera** R. Br. [*H. lacera* (Michx.) R. Br.]
Wet meadows and swamps; rare. Gates, *Dr. C. M. Booth* and *G. T. Fish*. Barnard's Crossing, Greece, *J. B. Fuller*, *Miss M. E. Macauley*. Mendon and Kendall, *M. S. Baxter*. Wayne county.

948. **H. psycodes** Gray. [*H. psycodes* (L.) A.Gray.] PURPLE FRINGED O.
Wet meadows and swamps; frequent.

387. CYPRIPEDIUM L.

949. **C. arietinum** R. Br. RAM'S-HEAD LADY'S SLIPPER.
Mud pond, Wayne county, *Miss Weed* and *Miss Coleman, in check list E. L. Hankenson*.

950. **C. candidum** Muhl. [*C. candidum* Willd.] WHITE LADY'S SLIPPER.
Rare. Bergen swamp, in the open marsh and along the edges of the woods bordering.

951. **C. parviflorum** Salisb. SMALL YELLOW LADY'S SLIPPER.
Marshes and damp woods; infrequent. Gates. Riga. Mendon. Adams Basin. Caledonia. Bergen. Wayne county.

952. **C. pubescens** Willd. [*C. hirsutum* Mill.] LARGE YELLOW LADY'S SLIPPER.
Woods and swamps; common.

953. **C. spectabile** Salisb. [*C. reginæ* Walt.] SHOWY LADY'S SLIPPER.
Swamps and wet meadows; frequent.

954. **C. acaule** Ait. STEMLESS LADY'S SLIPPER.
Dry or moist woods and swamps; frequent. Abundant in a swamp at Mendon.

IRIDACEÆ.

388. IRIS Tourn. [L.]

955. **I. versicolor** L. LARGE BLUE FLAG.
Marshes and swamps; frequent.

389. SISYRINCHIUM L.

956. **S. angustifolium** Mill. (*S. Bermudiana* var. *mucronatum* Gray, excl. descr.) [*S. Bermudiana* L.] BLUE-EYED GRASS.
Moist meadows; scarce.

AMARYLLIDACEÆ.

390. HYPOXIS L.

957. **H. erecta** L. [*H. hirsuta* (L.) Coville.] STAR-GRASS.
Damp meadows and grassy slopes; frequent.

LILIACEÆ.

391. SMILAX Tourn. [L.]

958. **S. herbacea** L. CARRION-FLOWER.
Woods and shaded banks of streams; frequent.

959. **S. rotundifolia** L.
Rare. Rochester, *Dewey*. *Prof. W. H. Lennon*.

960. **S. hispida** Muhl. GREEN-BRIER.
Moist thickets and swamps; frequent.

392. ALLIUM L.

961. **A. tricoccum** Ait. WILD LEEK.
Rich woods; infrequent.

962. **A. Canadense** Kalm. [*A. Canadense* L.] WILD GARLIC.
Ravines, moist meadows, and along streams; scarce. Rich's mills. *G. T. Fish*. Near Rochester, *Dr. C. M. Booth*. Maxwell's Station, Livingston Co., *Miss F. Beckwith*. Macedon, Wayne Co., *M. S. Baxter*.

963. A. VINEALE L. FIELD GARLIC.
Rare. Scottsville, *L. Holzer!*

ORNITHOGALUM Tourn. [L.]

— O. UMBELLATUM L. STAR OF BETHLEHEM. Escaped.

393. HEMEROCALLIS L.

964. H. FULVA L. ORANGE DAY-LILY.
Established by roadsides and on the banks of the Genesee river.

394. POLYGONATUM Tourn. [Adans.]

965. **P. biflorum** Ell. [*P. biflorum* (Walt.) Ell.] SMALLER SOLOMON'S SEAL.
River banks, ravine sides, moist woods; common.

966. **P. giganteum** Dietrich. [*P. biflorum commutatum* (R. & S.) Morong.] GREAT SOLOMON'S SEAL.
Rare. Bank of Genesee River, Rochester, *J. B. Fuller*. *G. T. Fish*. Wayne county.

395. ASPARAGUS Tourn. [L.]

967. A. OFFICINALIS L. Fields; frequent.

396. SMILACINA Desf. [VAGNERA Adans.]

968. **S. racemosa** Desf. [*Vagnera racemosa* (L.) Morong.] FALSE SOLOMON'S SEAL.
River banks, ravines, woods; common.

969. **S. stellata** Desf. [*Vagnera stellata* (L.) Morong.]
River banks and rich woods; frequent.

970. **S. trifolia** Desf. [*Vagnera trifolia* (L.) Morong.]
Rare. Adams Basin, *M. S. Baxter*. Bergen swamp.

397. MAIANTHEMUM Wigg. [UNIFOLIUM Adans.]

971. **M. Canadense** Desf. (*Smilacina bifolia* var. *Canadensis* Gray. [*Unifolium Canadense* (Desf.) Greene.] TWO-LEAVED SOLOMON'S SEAL.
Woods, ravines, and river banks; common.

398. STREPTOPUS Michx.

972. **S. roseus** Michx. TWISTED-STALK.
Rich woods and ravines; infrequent.

399. DISPORUM Salisb.

973. **D. lanuginosum** Benth. & H. (*Prosartes lanuginosa* Don.) [*Disporum lanuginosum* (Michx.) Britton.]
Rich woods; rare. Clem's woods (now Glen Haven R.R. station), *Dr. C. M. Booth*. Greece, *Bradley*. Wayne county.

400. CLINTONIA Raf.

974. **C. borealis** Raf. [*C. borealis* (Ait.) Raf.]
Very rare. Bergen swamp, *Dr. C. M. Booth!* Wayne county.

401. UVULARIA L.

975. **U. perfoliata** L.
Rich woods and ravines; frequent.

976. **U. grandiflora** J. E. Smith.
Rich woods and ravines; frequent.

402. OAKESIA S. Watson.

977. **O. sessilifolia** Watson. (*Uvularia sessilifolia* L.) [*U. sessilifolia* L.]
Ravines and low woods; frequent.

403. ERYTHRONIUM L.

978. **E. Americanum** Ker. YELLOW ADDER-TONGUE.
Ravines, woods, meadows; very common.

979. **E. albidum** Nutt. WHITE DOG'S-TOOTH VIOLET.
Low rich woods and ravines; scarce. Rich's mills, *Dr. C. M. Booth!* Penfield, *G. T. Fish*, *Otto Betz*. Black creek, Chili, *J. B. Fuller*. Scottsville, *Miss F. Beckwith*. *Prof. W. H. Lennon*. Wayne county.

404. LILIUM L.

980. **L. Philadelphicum** L. WILD ORANGE-RED LILY.
Dry woods, river banks, and sandy ridges; frequent.

981. **L. Canadense** L. WILD YELLOW LILY.
Low woods, moist meadows, borders of swamps, etc.; common.

405. MEDEOLA Gronov. [L.]

982. **M. Virginiana** L. INDIAN CUCUMBER-ROOT.
Rich moist woods; common.

406. TRILLIUM L.

983. **T. sessile** L.
Between Norton street and Ridge road, and Hudson street and North avenue, 1863, *L. Holzer*. Only one specimen.

984. **T. erectum** L. BIRTHROOT.
Rich woods, ravines; common. A white-flowered form is occasional.

985. **T. grandiflorum** Salisb. [*T. grandiflorum* (Michx.) Salisb.] LARGE WHITE WAKE ROBIN.
Woods, meadows, river banks, ravines; very common.

986. **T. cernuum** L. NODDING TRILLIUM.
Rare. Wayne county, *E. L. Hankenson*.

987. **T. erythrocarpum** Mx. [*T. undulatum* Willd.] PAINTED TRILLIUM.
Cool woods and swamps; scarce. Shore of Irondequoit bay, *Dr. C. M. Booth*. Greece, *G. T. Fish*. Chili, *Miss F. Beckwith*. Adams Basin, *M. S. Baxter*. Wayne county.

407. CHAMÆLIRIUM Willd.

988. **C. Carolinianum** Willd. (*C. luteum* Gray.) [*C. luteum* (L.) A. Gray.] BLAZING STAR.
Scarce. Woods on the sandy ridges about Irondequoit bay and elsewhere. Maxwell's Station, Caledonia, Livingston Co., *Miss Beckwith*.

408. TOFIELDIA Huds.

989. **T. glutinosa** Willd. [*T. glutinosa* Pers.] FALSE ASPHODEL.
Rare. Bergen swamp, Genesee county.

409. VERATRUM Tourn. [L.]

990. **V. viride** Ait.
Rare. Gates, *Dr. C. M. Booth*.

410. ZYGADENUS Michx.

991. **Z. elegans** Pursh. (*Z. glaucus* Nutt.)
Swamps; rare. Mumford, *Miss F. Beckwith*. Caledonia, Livingston county. Bergen swamp.

PONTEDERIACEÆ.

411. PONTEDERIA L.

992. **P. cordata** L. PICKEREL-WEED.
Borders of bays, ponds and inlets of lake Ontario; frequent.

412. HETERANTHERA Ruiz. & Pav.

993. **H. graminea** Vahl. (*Schollera graminifolia*, Willd.) [*Heteranthera dubia* (Jacq.) Morong.] MUD-PLANTAIN.
Frequent in the lower Genesee and the bays, ponds and inlets of lake Ontario. Adams Basin. Wayne county. When in mud, it blooms at a height of only two to four inches.

JUNCACEÆ.

413. JUNCUS Tourn. [L.] RUSH.

994. **J. effusus** L. BULRUSH.
Marshy ground; common.

995. **J. filiformis** L.
Rare. Shore of lake Ontario, *Dr. C. M. Booth*.

996. **J. Balticus** Deth. var. **littoralis** Englm. [*J. Balticus littoralis* Englm.]
Rare. Sandy shore of lake Ontario and muddy portions of Bergen swamp. Wayne county.

997. **J. tenuis** Willd.
Common in moist ground, fields, roadsides; abundant along paths.

998. **J. tenuis** Willd. var. ——— ? tall (20 to 30 inches) with crowded heads.
Rare. Shore of lake Ontario, *Dr. Anna H. Searing!*

999. **J. bufonius** L.
Low grounds and by roadsides; frequent.

1000. **J. articulatus** L.
Wet sandy soil, principally along or near the shore of lake Ontario.

1001. **J. alpinus** Villars, var. **insignis** Fries. [*J. alpinus insignis* Fries.]
Near the mouth of Genesee river, *J. B. Fuller*. Long pond, *Dr. A. H. Searing*. Banks of Genesee river near Avon, *Sartwell in Herb. Ham. Coll.* Wayne county.

1002. **J. acuminatus** Michx.
Borders of marshes; not common.

1003. **J. scirpoides** Lam.
Rare. Shore of lake Ontario, Monroe county, *Dr. C. M. Booth*. Sodus Point, Wayne county, *Dr. S. H. Wright*.

1004. **J. nodosus** L.
Low grounds and muddy shores; common.

1005. **J. nodosus** L.var. **megacephalus** Torr. [*J. nodosus megacephalus* Torr.]
Rare. Wet sandy soil near the shore of lake Ontario, *L. Holzer!* Long pond, *Dr. Anna H. Searing*.

1006. **J. Canadensis** J. Gay, var. **longicaudatus** Engl. [*J. Canadensis* J. Gay.]
Borders of swamps, marshes, etc.; frequent.

1007. **J. Canadensis** J. Gay, var. **coarctatus** Engelm. [*J. Canadensis coarctatus* Engelm.] Bergen swamp, *M. S. Baxter*.

414. LUZULA DC. [JUNCOIDES Adans.]

1008. **L. vernalis** DC. (*L. pilosa* Willd.) [*Juncoides pilosum* (L.) Kuntze.]
Woods, banks, and moist grass land; common.

1009. **L. campestris** DC. [*Juncoides campestre* (L.) Kuntze.]
Dry fields and woods; common.

TYPHACEÆ.

415. TYPHA Tourn. [L.]

1010. **T. latifolia** L. COMMON CAT-TAIL FLAG.
Swamps and marshy places; common.

1011. **T. latifolia** L. var. **elongata** Dudley.
Characterized in Cay. Fl. p. 102. The prevailing form on the extensive marshes at Irondequoit bay.

1012. **T. angustifolia** L.
Frequent on the marshes at Irondequoit bay, Long pond, etc.

416. SPARGANIUM Tourn. [L.]

1013. **S. eurycarpum** Engelm.
Marshes on the borders of bays, ponds, etc.; frequent.

1014. **S. simplex** Huds.
Marshes and borders of ponds, etc.; frequent.

1015. **S. minimum** Fries.
Very rare. In a little pool, Irondequoit, *Dr. C. M. Booth*.

ARACEÆ.

417. ARISÆMA Martius.

1016. **A. triphyllum** Torr. [*A. triphyllum* (L.) Torr.] INDIAN TURNIP.
Rich woods and ravines; common.

1017. **A. Dracontium** Schott. [*A. Dracontium* (L.) Schott.] GREEN DRAGON.
Damp thickets; rare. Shore of Irondequoit bay, Irondequoit, and Black creek, Chili, *Dr. Booth*. Black creek, *Otto Betz*. Wayne county.

418. PELTANDRA Raf.

1018. **P. undulata** Raf. (*P. Virginica* Kunth.) [*P. Virginica* (L.) Kunth]
Marshes along Genesee river and elsewhere; not uncommon.

419. CALLA L.

1019. **C. palustris** L. WILD CALLA.
Borders of marshes and sphagnum bogs; infrequent. Genesee river, near lake Ontario. Borders of marshes at Henrietta, Mendon, Hamlin, and elsewhere. Wayne county.

420. SYMPLOCARPUS Salisb. [SPATHYEMA Raf.]

1020. **S. fœtidus** Salisb. [*Spathyema fœtida* (L.) Raf.] SKUNK CABBAGE.
Marshes and wet ground; common.

421. ACORUS L.

1021. **A. Calamus** L. SWEET FLAG.
Marshes; common.

LEMNACEÆ.

422. SPIRODELA Schleiden.

1022. **S. polyrhiza** Schleiden. (*Lemna polyrhiza* L.) [*Spirodela polyrhiza* (L.) Schleid.]
Bays, ponds and marshes; common.

423. LEMNA L. DUCK-WEED. DUCK'S-MEAT.

1023. **L. trisulca** L.
Bays, ponds, marshes, etc.; common.

1024. **L. minor** L.
Bays, ponds, pools, marshes, ditches; abundant.

424. WOLFFIA Horkel.

1025. **W. Columbiana** Karsten.
Abundant at Irondequoit bay and elsewhere.

ALISMACEÆ.

425. ALISMA L.

1026. **A. Plantago** L. (*A. Plantago* L.var.*Americanum* Gray.) [*A. Plantago-aquatica* L.] WATER PLANTAIN.
Marshes, ditches, and borders of streams; common.

426. SAGITTARIA L. ARROW-HEAD.

1027. **S. variabilis** Engelm. (incl. vars. *obtusa, latifolia, diversifolia, angustifolia*, and *gracilis* of Man. ed. 5). [*S. latifolia* Willd.]
Aquatic or in wet places; common.

1028. **S. heterophylla** Pursh. [*S. rigida* Pursh, incl. var. *elliptica* Engelm.]
Genesee river and elsewhere; frequent.

1029. **S. heterophylla** Pursh, var. **elliptica** Engelm.
Frequent along the margin of Genesee river.

NAIADACEÆ.

427. TRIGLOCHIN L. ARROW-GRASS.

1030. **T. palustris** L.
Abundant in Bergen swamp.

1031. **T. maritima** L.
Common in Bergen swamp. Wayne county.

428. SCHEUCHZERIA L.

1032. **S. palustris** L.
Rare. In sphagnum bogs at Mendon. Wayne county.

429. POTAMOGETON Tourn. [L.] POND-WEED.

1033. **P. natans** L.
Ponds and stagnant water; common.

1034. **P. fluitans** Roth. (*P. lonchites* Tuckerm.) [*P. lonchites* Tuckerm.]
Genesee river, Irondequoit bay, Long pond, etc.

1035. **P. amplifolius** Tuckerm.
Irondequoit bay, Long pond, etc. Wayne county.

1036. **P. heterophyllus** Schreb. (*P. gramineus* Fries.)
Irondequoit bay, etc.; common.

1037. **P. lucens** L.
Genesee river, Irondequoit bay, etc.; frequent.

1038. **P. prælongus** Wulf.
Wayne county.

1039. **P. perfoliatus** L.
Bays, ponds and slow streams; common.

1040. **P. crispus** L.
Long pond, *Dr. Anna H. Searing*.

1041. **P. zosteræfolius** Schum. (*P. compressus* Man.)
Frequent in Irondequoit bay, Long pond, etc.

1042. **P. pauciflorus** Pursh. [*P. foliosus* Raf.]
Near Rochester, *Dr. C. M. Booth*. Wayne county.

1043. **P. pusillus** L.
Irondequoit bay. Wayne county, *E. L. Hankenson*.

1044. **P. pectinatus** L.
Genesee river, bays, ponds, etc.; common.

1045. **P. Robbinsii** Oakes.
Irondequoit bay, etc.; common.

430. ZANNICHELLIA Micheli. [L.]

1046. **Z. palustris** L.
Irondequoit bay, etc.; not common. The var. *pedunculata* occurs in Thomas's creek, Brighton, *Dr. C. M. Booth*.

431. NAIAS L. NAIAD.

1047. **N. marina** L. var. **recurvata** (?) Dudley.
Abundant in two of the coves and sparingly elsewhere in Irondequoit bay.

1048. **N. flexilis** Rostk. & Schmidt. [*N. flexilis* (Willd.) Rostk. & Schmidt.]
Bays, ponds, etc.; common.

CYPERACEÆ.

432. CYPERUS Tourn. [L.] GALINGALE.

1049. **C. diandrus** Torr.
Moist or wet ground; frequent.

1050. **C. diandrus** Torr. var. **castaneus** Torr.
With the preceding.

1051. **C. aristatus** Rottb. (*C. inflexus* Muhl.)
Rare. Sodus bay, Wayne county, *G. T. Fish*.

1052. **C. Schweinitzii** Torr.
Scarce. Shore of lake Ontario, from Braddock's bay to Sodus.

1053. **C. filiculmis** Vahl.
Rare. Dry banks of Irondequoit bay: west side, Irondequoit, *G. T. Fish;* east side, Penfield, *L. Holzer;* Webster, *Dr. Booth, M. S. Baxter.*

1054. **C. esculentus** L. (*C. phymatodes* Muhl.)
Low grounds; not common. Center square, Rochester. In grass along Lake avenue, near the city line. Riverside avenue and vicinity. Wayne county.

1055. **C. strigosus** L.
Low grounds; common.

1056. **C. speciosus** Vahl. (*C. Michauxianus* Man.)
Frequent on the shore of lake Ontario. Mud creek flats, Wayne Co.

433. DULICHIUM Pers. [L. C. Richard.]

1057. **D. spathaceum** Pers. [*D. arundinaceum* (L.) Britton.]
Frequent in marshes and on the borders of ponds.

434. ELEOCHARIS R. Br. SPIKE-RUSH.

1058. **E. ovata** R. Br. (*E. obtusa* Schult.) [*E. ovata* (Roth) Roem. & Schult.]
Low grounds and muddy shores; common.

1059. **E. olivacea** Torr.
Monroe county, *Dr. Searing*. Wayne county, *E. L. Hankenson*.

1060. **E. palustris** R. Br. [*E. palustris* (L.) Roem. & Schult.]
Shallow water, muddy shores, marshes, etc.; common.

1061. **E. rostellata** Torr.
Common in Bergen swamp.

1062. **E. intermedia** Schult. [*E. intermedia* (Muhl.) Schult.]
Shore of lake Ontario, ponds, etc.; frequent.

1063. **E. tenuis** Schult. [*E. tenuis* (Willd.) Schult.]
Marshes; frequent.

1064. **E. compressa** Sullivant. [*E. acuminata* (Muhl.) Nees.]
Dr. Anna H. Searing.

1065. **E. acicularis** R. Br. [*E. acicularis* (L.) Roem. & Schult.]
Muddy shores; common.

1066. **E. pauciflora** Link. (*Scirpus pauciflorus* Lightfoot.) [*Scirpus pauciflorus* Lightfoot.]
Rare. Bergen swamp, Genesee county. Sodus bay, *Geo. T. Fish*. Wayne county, *E. L. Hankenson*.

435. SCIRPUS Tourn. [L.]

1067. **S. cæspitosus** L.
Common in Bergen swamp.

1068. **S. subterminalis** Torr.
Wayne county, *E. L. Hankenson*.

1069. **S. pungens** Vahl. [*S. Americanus* Pers.]
Shores and swamps; frequent. A form with 3-cleft style is abundant along the margin of Genesee river a short distance below the lower falls.

1070. **S. lacustris** L. (*S. validus* Vahl.)
Genesee river, bays, ponds, marshes; common.

1071. **S. Smithii** Gray.
Rare. Shore of lake Ontario at the outlet of Braddock's bay, *J. B. Fuller*. Sodus bay, *G. T. Fish*.

1072. **S. fluviatilis** Gray. [*S. fluviatilis* (Torr.) A. Gray.]
Common in Genesee river, Irondequoit bay, Long pond, etc.

1073. **S. sylvaticus** L. var. **digynus** Bœck. (*S. microcarpus* Presl.) [*S. microcarpus* Presl.]
Low, wet grounds; infrequent.

1074. **S. atrovirens** Muhl.
Low grounds and swamps; common.

436. ERIOPHORUM L. COTTON-GRASS.

1075. **E. lineatum** Benth. & Hook. (*Scirpus lineatus* Michaux.) [*Scirpus lineatus* Michaux.]
Low grounds; not common.

1076. **E. cyperinum** L. [*Scirpus cyperinus* (L.) Kunth.] WOOL-GRASS.
Low grounds; common.

1077. **E. cyperinum** L. var. **laxum**. [*Scirpus cyperinus Eriophorum* (Michx.) Britton.]
Low grounds and marshes; frequent.

1078. **E. alpinum** L.
Wayne county, *E. L. Hankenson*.

1079. **E. vaginatum** L.
Wayne county, *E. L. Hankenson*.

1080. **E. Virginicum** L.
Sphagnum swamps; frequent.

1081. **E. Virginicum** L. var. **album** Gray. [*E. Virginicum album* A. Gray.]
Mendon, *M. S. Baxter*. Wayne county, *E. L. Hankenson*.

1082. **E. polystachyon** L.
Sphagnum swamps; common.

1083. **E. gracile** Koch.
Sphagnum swamps; rare. Mendon, *J. B. Fuller.* Wayne county.

437. RHYNCHOSPORA Vahl.

1084. **R. alba** Vahl. [*R. alba* (L.) Vahl.]
Frequent in the sphagnum swamps at Mendon and Bergen. Wayne county.

1085. **R. capillacea** Torr.
Rare. Rocky bank of Genesee river, Rochester, *J. B. Fuller.* Bergen swamp, Genesee county.

438. CLADIUM P. Browne.

1086. **C. mariscoides** Torr. [*C. mariscoides* (Muhl.) Torr.]
Scarce. In the marshes at Mendon and Bergen. Wayne county.

439. SCLERIA Berg.

1087. **S. triglomerata** Michx.
Rare. Near Rochester, *Dr. C. M. Booth.*

1088. **S. pauciflora** Muhl.
Rare. Greece, *Bradley.*

1089. **S. verticillata** Muhl.
Cold swamps. Mendon, *M. S. Baxter.* Bergen, *Dr. Booth, G. T. Fish.*

440. CAREX Ruppius. [L.] SEDGE.

1090. **C. intumescens** Rudge.
Wet meadows and swamps; frequent.

1091. **C. Grayii** Carey. [*C. Asa-Grayi* Bailey.]
Rare. Near Rochester, *Dr. C. Dewey, Dr. C. M. Booth, L. Holzer.* Wayne county.

1092. **C. lupulina** Muhl.
Swamps; common.

1093. **C. lupulina** Muhl. var. **pedunculata** Dew. (*C. gigantea* Rudge.) [*C. lupulina gigantea* (Rudge) Britton.]
Rare. Monroe county, *G. T. Fish.*

1094. **C. lupulina** Muhl. var. **polystachya** Schwein. & Torr. (*C. lupuliformis* Sartwell.) [*C. lupulina polystachya* Schwein. & Torr.]
Monroe county, *G. T. Fish.* Wayne county, *E. L. Hankenson.*

1095. **C. utriculata** Boott.
Swamps; frequent.

1096. **C. utriculata** var. **minor** Boott. [*C. utriculata minor* Boott.]
Swamps; frequent.

1097. **C. monile** Tuckerm.
Rare. *L. Holzer.*

1098. **C. Tuckermani** Dewey.
Infrequent. Near Charlotte, *George T. Fish.* Chili, *M. S. Baxter.* Wayne county.

1099. **C. retrorsa** Schw.
Wet meadows and marshes; frequent.

1100. **C. retrorsa** Schw. var. **Hartii** Gray. [*C. retrorsa Hartii* (Dew.) A. Gray.]
Rare. *E. L. Hankenson*.

1101. **C. lurida** Wahl. (*C. tentaculata* Muhl.)
Marshy places and swamps; common.

1102. **C. hystricina** Muhl.
Swales and along streams; frequent.

1103. **C. Pseudo-Cyperus** L.
Frequent in marshes along the Genesee river, and elsewhere.

1104. **C. Pseudo-Cyperus** L. var. **Americana** Hochst. (*C. comosa* Boott.) [*C. Pseudo-Cyperus Americana* Hochst.]
Marshes; frequent.

—— **C. squarrosa** L. is reported by *L. Holzer*.

1105. **C. scabrata** Schwein.
Rare. Wet woods near Rich's dugway, *M. S. Baxter*. Bergen swamp, *Dr. C. M. Booth* and *G. T. Fish*. Wayne county.

1106. **C. Houghtonii** Torr.
Rare. Long pond, *Dr. Anna H. Searing*.

1107. **C. filiformis** L.
Bergen swamp, Genesee county. Sodus bay, Wayne county.

1108. **C. filiformis** L. var. **latifolia** Bœckl. (*C. lanuginosa* Michx.) [*C. filiformis lanuginosa* (Michx.) B.S.P.]
Marshes; infrequent. Irondequoit bay, Round pond, etc.

1109. **C. trichocarpa** Muhl.
Marshes; scarce. Margin of Genesee river, Greece, *J. B. Fuller*. Irondequoit bay, *Dr. C. M. Booth* and *G. T. Fish*. Ontario county, *E. L. Hankenson*.

1110. **C. trichocarpa** Muhl. var. **aristata** Bailey. (*C. aristata* R. Brown.) [*C. trichocarpa aristata* (R. Br.) Bailey.]
Greece, eleven miles west of Rochester, six miles south of lake Ontario, *Dr. Bradley*, 1829: *Dewey* in Sill. V. 38, p. 290.—*18th N. Y. Rep.*

1111. **C. riparia** Curtis.
Marshes; frequent.

1112. **C. fusca** All. (*C. Buxbaumii* Wahl.)
Rare. Bank of Genesee river, *Bradley*. Bergen swamp.

1113. **C. rigida** Good. var. **Goodenovii** Bailey. (*C. vulgaris* Fries.) [*C. rigida Goodenovii* (J. Gay) Bailey.]
Rare. Monroe county, *Dr. Anna H. Searing*. Wayne county.

1114. **C. stricta** Lam.
Marshes; frequent.

1115. **C. aquatilis** Wahl.
Marshes; scarce. Mendon, *J. B. Fuller*. Adams Basin, *M. S. Baxter*. Wayne county.

1116. **C. torta** Boott.
Rare ? *Dr. C. M. Booth.*

1117. **C. prasina** Wahl. (*C. miliacea* Muhl.)
Wet woods and meadows; frequent.

1118. **C. crinita** Lam. (*C. gynandra* Schwein.)
Low wet woods and swales; common.

1119. **C. limosa** L.
Scarce. Mendon, *M. S. Baxter.* Wayne county.

1120. **C. virescens** Muhl.
Woods; infrequent. Near Rochester, *Dr. C. M. Booth, L. Holzer.* Adams Basin, *M. S. Baxter.*

1121. **C. virescens** Muhl. var. **costata** Dewey. [*C. virescens costata* (Schw.) Dewey.]
Woods; infrequent. Monroe county. Wayne county.

1122. **C. triceps** Mx. var. **hirsuta** Bailey. [*C. triceps hirsuta* (Willd.) Bailey.]
Rare. Vicinity of Rochester, *Dr. C. M. Booth, L. Holzer.*

1123. **C. longirostris** Torr.
Rare. Western part of Monroe county, *Prof. Lennon.* Wayne Co.

1124. **C. arctata** Boott.
Dry rich woods and shady banks; infrequent.

1125. **C. debilis** Michx. var. **Rudgei** Bailey. (*C. debilis* Man.) [*C. debilis Rudgei* Bailey.]
Rare. Near Rochester, *Dr. C. M. Booth, Dr. Anna H. Searing.*

1126. **C. gracillima** Schwein.
Woods and low meadows; common.

1127. **C. gracillima** Schw. × **C. arctata** Boott.
Adams Basin, *M. S. Baxter.*

1128. **C. grisea** Wahl.
Scarce. Vicinity of Rochester, *Dr. Booth, L. Holzer.* Wayne Co.

1129. **C. granularis** Muhl.
Wet grassy places and along streams; common.

1130. **C. granularis** Muhl. var. **Haleana** Porter. [*C. granularis Haleana* (Olney) Porter.]
Bergen swamp, *J. B. Fuller.*

1131. **C. Crawei** Dewey.
Rare. On barren spots of marl in Bergen swamp.

1132. **C. flava** L.
Wet grassy meadows and swamps; not common. Frequent in low ground and wet woods bordering Bergen swamp. Wayne county.

1133. **C. flava** L. var. **viridula** Bailey. (*C. Œderi* Man.) [*C. flava viridula* (Michx.) Bailey.]
Cold bogs; rare. Frequent in the marly soil of Bergen swamp. Sodus Point, Wayne county.

1134. **C. pallescens** L.
Scarce. In clayey soil, Seneca park, near Maple Grove, *J. B. Fuller. L. Holzer.* Wayne county. The form with lower bract transversely wavy-lined, *C. undulata* Kunze, occurs with the type in Seneca park.

1135. **C. conoidea** Schk.
Long pond, *Dr. Anna H. Searing. L. Holzer.*

1136. **C. oligocarpa** Schk.
Rare. Black creek, *Dr. Anna H. Searing.*

1137. **C. Hitchcockiana** Dewey.
Scarce. Sandy grove, Irondequoit, *L. Holzer.* Abundant south of Rochester, *Dewey.* Murray, Orleans Co., *M. S. Baxter.* Wayne Co.

1138. **C. laxiflora** Lam.
Dry or moist woods, ravines, meadows; infrequent.

1139. **C. laxiflora** Lam. var. **striatula** Carey. [*C. laxiflora blanda* (Dewey) Boott.]
Wayne county, *E. L. Hankenson.*

1140. **C. laxiflora** Lam. var. **latifolia** Boott. [*C. albursina* Sheldon.]
Rich woods and ravines; frequent.

1141. **C. laxiflora** Lam. var. **patulifolia** Carey. [*Carex laxiflora patulifolia* (Dewey) Carey.]
Dry or moist woods, meadows, ravines, hills; common.

1142. **C. digitalis** Willd.
River banks, ravines, etc.; common. Wet meadows, Greece, *Holzer.*

1143. **C. laxiculmis** Schwein. (*C. retrocurva* Dewey.)
Woods and copses; common.

1144. **C. platyphylla** Carey.
Rich shady woods, river banks, ravines; common.

1145. **C. Careyana** Torr.
Rare. Woods near Genesee river, four or five miles above Rochester, *W. Boott: Dr. C. Dewey.* Copses in Henrietta, *J. E. Paine.* Wayne county, *E. L. Hankenson.*

1146. **C. plantaginea** Lam.
Wet woods, river banks and ravines; frequent.

1147. **C. Saltuensis** Bailey. (*C. vaginata* Man.)
Local. Moist banks, under evergreens, on the border of Bergen swamp, Genesee county.

1148. **C. tetanica** Schk.
Wayne county, *E. L. Hankenson.*

1149. **C. aurea** Nutt.
Wet rocks and banks; infrequent. Rocky banks of Genesee river, Rochester; shores of Irondequoit bay; and elsewhere.

1150. **C. eburnea** Boott.
Frequent on dry cliffs of the Genesee river. Shady borders of Bergen swamp.

1151. **C. Richardsoni** R. Br.
Rare. Dry woods, Parma, *Bradley*.

1152. **C. pedunculata** Muhl.
Low woods, ravines, etc.; common.

1153. **C. varia** Muhl. (*C. Emmonsii* Dew.)
Dry woods, ravines, hillsides; frequent.

1154. **C. Pennsylvanica** Lam.
Dry woods and banks; common.

1155. **C. communis** Bailey. (*C. varia* Man.) [*C. pedicellata* (Dew.) Britton.]
Dry wooded hills and ravine sides; common.

1156. **C. umbellata** Schk.
Sandy knolls and banks; infrequent.

1157. **C. pubescens** Muhl.
Wayne county, *E. L. Hankenson*.

1158. **C. Jamesii** Schwein. (*C. Steudelii* Kunth.)
Wayne county, *E. L. Hankenson*.

1159. **C. polytrichoides** Muhl. [*C. leptalea* Wahl.]
Bogs and marshes; abundant.

1160. **C. chordorhiza** Ehrh. [*C. chordorhiza* L.f.]
Wayne county: Sodus point, *Mr. Baxter*; Mud pond, *Mr. Hankenson*.

1161. **C. stipata** Muhl.
Wet meadows, etc.; common.

1162. **C. decomposita** Muhl.
Rare. Livingston county, *E. L. Hankenson*.

1163. **C. teretiuscula** Gooden.
Swamps; infrequent. *Dr. C. Dewey*. *Dr. Searing*. Wayne county.

1164. **C. teretiuscula** Gooden. var. **ramosa** Boott. [*C. teretiuscula ramosa* Boott.] Bergen swamp.

1165. **C. alopecoidea** Tuckerm.
Monroe Co., *Dr. Booth*, *L. Holzer*. Ontario Co., *Mr. Hankenson*.

1166. **C. vulpinoidea** Michx.
Low grounds; common.

1167. **C. Sartwellii** Dewey. (*C. disticha* Huds.)
Rare. Monroe county, *Dr. C. M. Booth*. Wayne county.

1168. **C. tenella** Schk.
Rare. Adams Basin, *M. S. Baxter*. Bergen swamp, *G. T. Fish* and *Dr. C. M. Booth*. Wayne county.

1169. **C. rosea** Schk.
Woods and banks; common.

1170. **C. rosea** Schk. var. **radiata** Dewey. [*C. rosea radiata* Dewey.]
Scarce. *Dr. Searing*. Adams Basin, *M. S. Baxter*.

1171. **C. rosea** Schk. var. **retroflexa** Torr. [*C. retroflexa* Muhl.]
Vicinity of Rochester, *Dr. Anna H. Searing*.

1172. **C. sparganioides** Muhl.
Rich woods, wet meadows, etc.; common.

1173. **C. Muhlenbergii** Schk.
Rare. Dry sandy ridges near Irondequoit bay. Sandy knolls at Mendon ponds. Braddock's bay, *Bradley.*
A form approaching var. *enervis* Boott occurs at Mendon, *Mr. Baxter.*

1174. **C. cephalophora** Muhl.
Dry fields, knolls, etc.; common.

1175. **C. gynocrates** Wormsk. [*C. Redowskyana* C. A. Meyer.]
Rare. Springy banks a few miles south of Rochester, *Dr. C. Dewey.* Bergen swamp, Genesee county.

1176. **C. exilis** Dewey.
Wayne county, *E. L. Hankenson.*

1177. **C. interior** Bailey, Bull. Torr. Club, 20: 426 (1893).
Low ground, Adams Basin and Macedon, *M. S. Baxter.*

1178. **C. echinata** Murray, var. **microstachys** Bœckl. (*C. scirpoides* Schk. *C. sterilis* Willd.) [*C. sterilis* Willd.]
Frequent in sphagnum swamps.

1179. **C. sterilis excelsior** Bailey, Bull. Torr. Club, 20: 424 (1893).
Bergen swamp, *M. S. Baxter.*

1180. **C. trisperma** Dewey.
Swamps; scarce. Gates, *Geo. T. Fish.* Mendon, *M. S. Baxter.* Wayne county.

1181. **C. Deweyana** Schwein.
Dry woods; infrequent. Henrietta, Adams Basin, Brockport, Macedon, and elsewhere.

1182. **C. bromoides** Schk.
Swamps, marshes; common.

1183. **C. siccata** Dewey.
Rare. Dry hillsides, Penfield, *M. S. Baxter.* Bergen swamp, *Clinton.*

1184. **C. tribuloides** Wahl. (*C. lagopodioides* Schk.)
Open marshes and low meadows; common.

1185. **C. tribuloides** Wahl. var. **Bebbii** Bailey. [*C. tribuloides Bebbii* (Olney) Bailey.]
Low grounds; common.

1186. **C. tribuloides** Wahl. var. **cristata** Bailey. (*C. cristata* Schweinitz) [*C. tribuloides cristata* (Schwein.) Bailey.]
Low grounds and fields; common.

1187. **C. scoparia** Schk.
Wet grass lands; common.

1188. **C. straminea** Willd.
Moist copses and fields; infrequent.

1189. **C. straminea** Willd. var. **mirabilis** Tuckerm. [*C. straminea mirabilis* (Dewey) Tuckerm.]
Wet meadows; frequent.

1190. **C. straminea** Willd. var. **brevior** Dewey. [*C. straminea festucacea* (Willd.) Tuckerm.]
Moist grass lands; frequent.

GRAMINEÆ.

441. SPARTINA Schreber.

1191. **S. cynosuroides** Willd. [*S. cynosuroides* (L.) Willd.]
Frequent in the marshes bordering the Genesee river.

442. PASPALUM L.

1192. **P. setaceum** Michx. *Dr. Anna H. Searing.*

443. PANICUM L.

1193. P. GLABRUM Gaudin. [*P. lineare* Krock.]
Cultivated and waste grounds; frequent.

1194. P. SANGUINALE L. CRAB GRASS.
Cultivated and waste grounds, roadsides; common.

1195. **P. proliferum** Lam.
Sandy fields; rare. Penfield, *Dr. C. M. Booth.*

1196. **P. capillare** L. OLD-WITCH GRASS.
Cultivated fields and waste places; common.

1197. **P. virgatum** L.
Rare. Sandy soil, Penfield, *Dr. C. M. Booth, G. T. Fish.*

1198. **P. latifolium** L. [*P. Walteri* Poir.]
Moist woods and banks of streams; frequent.

1199. **P. clandestinum** L.
Rare. Penfield, *Dr. C. M. Booth. L. Holzer. A. B. Leckenby.*

1200. **P. depauperatum** Muhl.
Dry woods and banks; frequent.

1201. **P. dichotomum** L.
Dry woods and banks; common and very variable.

1202. P. CRUS-GALLI L. BARN-YARD GRASS.
Waste places, ditches, marshes; common.

1203. P. CRUS-GALLI L. var. MUTICUM Vasey.
Low ground, near the eastern wide-water, Brighton.

1204. **P. Crus-galli** L. var. **hispidum** Torr. [*P. Crus-Galli hispidum* (Muhl.) Torrey.]
Marshes at Irondequoit bay and elsewhere.

444. SETARIA Beauv. [CHAMÆRAPHIS R. Br.] FOXTAIL.

1205. S. GLAUCA Beauv. [*Chamæraphis glauca* (L.) Kuntze.]
Fields and waste grounds; common.

1206. S. VIRIDIS Beauv. [*Chamæraphis viridis* (L.) Porter.]
Cultivated fields; common.

1207. S. ITALICA Kunth. [*Chamæraphis Italica* (L.) Kuntze.]
Occasionally spontaneous.

445. CENCHRUS L.

1208. C. TRIBULOIDES L.
Along the N. Y. C. railroad from East Rochester eastward.

446. LEERSIA Swartz. [HOMALOCENCHRUS Mieg.]

1209. L. **Virginica** Willd. [*Homalocenchrus Virginicus* (Willd.) Britton.]
Rare. Shore of Irondequoit bay, *Dr. C. M. Booth*. Wayne county.

1210. L. **oryzoides** Swartz. [*Homalocenchrus oryzoides* (L.) Poll.] CUT GRASS.
Marshes and wet ground along streams; common.

447. ZIZANIA Gronov. [L.]

1211. Z. **aquatica** L. INDIAN RICE.
Frequent in all the bays, inlets and marshes along lake Ontario.

448. ANDROPOGON Royen. [L.]

1212. A. **furcatus** Muhl. [*A. provincialis* Lam.]
Dry banks; frequent.

1213. A. **scoparius** Michx.
Dry ground; common.

449. CHRYSOPOGON Trin.

1214. C. **nutans** Man. 6th ed. (*Sorghum nutans* Gray.) [*Andropogon nutans avenaceus* (Michx.) Hack.]
Frequent on dry banks and shores.

450. PHALARIS L.

—— P. CANARIENSIS L. CANARY GRASS.
Frequent in waste places and door-yards.

1215. P. **arundinacea** L. REED CANARY GRASS.
Abundant in marshes along the Genesee river.

1216. P. ARUNDINACEA L. var. PICTA. RIBBON GRASS.
Escaped and established along N.Y. C. R. R. in Chili, *Miss Beckwith*.

451. ANTHOXANTHUM L.

1217. A. ODORATUM L. SWEET VERNAL GRASS.
Roadsides and pastures; infrequent. Irondequoit. Gates.

452. HIEROCHLOE Gmelin. [SAVASTANA Schrank.]

1218. H. **borealis** Roem. & Schultes. [*Savastana odorata* (L.) Scribn.]
Rare. Wayne county, *E. L. Hankenson*.

453. ORYZOPSIS Michx.

1219. O. **melanocarpa** Muhl.
Rocky woods, banks and ravine sides; frequent.

1220. O. **asperifolia** Michx. MOUNTAIN RICE.
Common in woods along river banks and ravines and on hillsides.

1221. O. **Canadensis** Torr. [*O. juncea* (Michx.) B. S. P.]
Rare. Sandy bank of Irondequoit bay, *Dr. C. M. Booth*.

454. MILIUM Tourn. [L.]

1222. M. **effusum** L. MILLET GRASS.
Wet places and swamps; not common.

455. MUHLENBERGIA Schreber.

1223. **M. sobolifera** Trin. [*M. sobolifera* (Muhl.) Trin.]
Rare. *L. Holzer.*

1224. **M. glomerata** Trin. [*M. racemosa* (Michx.) B. S. P.]
Swamps and ravines. Abundant in Bergen swamp.

1225. **M. Mexicana** Trin. [*M. Mexicana* (L.) Trin.]
Low grounds; common.

1226. **M. sylvatica** Torr. & Gray. [*M. sylvatica* (Torr.) A. Gray.]
Moist soil, borders of woods and streams. Abundant on the flats of the Genesee river and on the banks of Irondequoit creek.

1227. **M. Willdenovii** Trin. [*M. tenuiflora* (Willd.) B. S. P.]
Infrequent. Bank of Genesee river, below the lower falls. Sandy knolls at Mendon ponds.

1228. **M. diffusa** Schreber. NIMBLE WILL.
Fields and roadsides; frequent.

456. BRACHYELYTRUM Beauv.

1229. **B. aristatum** Beauv. [*B. erectum* (Schreb.) Beauv.]
Ravine sides and rocky banks of Genesee river; frequent.

457. PHLEUM L.

1230. P. PRATENSE L. TIMOTHY.
Fields and waysides; common.

458. ALOPECURUS L. FOXTAIL GRASS.

1231. A. PRATENSIS L. MEADOW FOXTAIL.
Scarce. *L. Holzer. Prof. W. H. Lennon.*

1232. **A. geniculatus** L. var. **aristulatus** Torrey. (*A. aristulatus* Michaux.) [*A. geniculatus fulvus* (J. E. Smith.) Scribn.]
Wet meadows; frequent.

459. SPOROBOLUS R. Br.

1233. **S. vaginæflorus** Vasey. (*Vilfa vaginæflora* Torr.) [*Sporobolus vaginæflorus* (Torr.) Wood.]
Rare. Wayne county, *E. L. Hankenson.*

1234. **S. cryptandrus** Gray. [*S. cryptandrus* (Torr.) A. Gray.]
Rare. Sandy shore of lake Ontario.

460. AGROSTIS L. BENT-GRASS.

1235. A. ALBA L. WHITE BENT-GRASS.
Low grass lands; common.

1236. A. ALBA L. var. VULGARIS Thurb. (*A. vulgaris* With.) [*A. alba vulgaris* (With.) Thurb.] RED-TOP.
Meadows, fields, pastures; common.

1237. **A. perennans** Tuckerm. [*A. perennans* (Walt.) Tuckerm.]
Common in open woods about Irondequoit bay; frequent elsewhere.

1238. **A. scabra** Willd. [*A. hiemalis* (Walt.) B. S. P.] HAIR-GRASS.
Bluffs along lake Ontario and Irondequoit bay.

461. CINNA L.

1239. **C. arundinacea** L.
Marshes and swampy woods; frequent.

1240. **C. pendula** Trin. (*C. arundinacea* var. *pendula* Gray.) [*C. latifolia* (Trev.) Griesb.]
Rare. Ravines, Irondequoit. Wayne county.

462. CALAMAGROSTIS Adans.

1241. **C. Canadensis** Beauv. [*C. Canadensis* (Michx.) Beauv.] BLUE-JOINT.
Marshes; common.

463. AMMOPHILA Host.

1242. **A. arundinacea** Host. (*Calamagrostis arenaria* Roth.) [*Ammophila arenaria* (L.) Link.]
Common on the barren beach of lake Ontario.

464. ARRHENATHERUM Beauv.

1243. A. AVENACEUM Beauv. [*A. elatius* (L.) Beauv.] OAT GRASS.
Rochester, *Dr. C. M. Booth*. *Dr. A. H. Searing*. Wayne county.

465. HOLCUS L.

1244. H. LANATUS L. MEADOW SOFT-GRASS. VELVET-GRASS.
Meadows in Genesee Valley park, Rochester. *L. Holzer*.

466. DESCHAMPSIA Beauv.

1245. **D. flexuosa** Trinius. (*Aira flexuosa* L.) [*D. flexuosa* (L.) Trinius.]
Common in dry woods along the banks of the Genesee river, below Rochester; occasional on dry slopes elsewhere.

1246. **D. cæspitosa** Beauv. (*Aira cæspitosa* L.) [*D. cæspitosa* (L.) Beauv.]
Rare. Rocky bank of Genesee river, near foot of White street, Rochester, *J. B. Fuller*. Bergen swamp, *J. E. Paine!* Sodus, Wayne county, *E. L. Hankenson*.

467. TRISETUM Pers.

1247. **T. subspicatum** Beauv. var. **molle** Gray. [*T. subspicatum molle* (Mx.) A. Gray.]
Rare. Dry sandy bank, Brighton, *Dr. C. M. Booth!*

1248. **T. palustre** Torr. [*T. palustre* (Michx.) Torr.]
Rare. Near Rochester, *Dr. C. M. Booth*.

468. AVENA Tourn. [L.]

1249. **A. striata** Michx.
Monroe county, *Dr. Anna H. Searing*. *G. T. Fish*.

—— A. SATIVA L., COMMON OAT, is frequently spontaneous.

469. DANTHONIA DC.

1250. **D. spicata** Beauv. [*D. spicata* (L.) Beauv.] WILD OAT-GRASS.
Dry banks and hills; common.

CYNODON Richard. [CAPRIOLA Adans.]

—— C. DACTYLON Pers. [*Capriola Dactylon* (L.) Kuntze.] BERMUDA GRASS.
In mold brought from the woods, *Dr. A. H. Searing*.

470. BOUTELOUA Lagasca.

1251. **B. racemosa** Lagasca. (*B. curtipendula* Gray.) [*B. curtipendula* (Michx.) Torr.] MUSKIT GRASS.
Rare. Irondequoit, *Prof. W. H. Lennon* and *M. S. Baxter*.

471. ELUSINE Gærtn.

1252. E. INDICA Gærtn. [*E. Indica* (L.) Gærtn.] CRAB GRASS.
Pittsford, *Dr. C. M. Booth*. Wayne county.

472. PHRAGMITES Trin.

1253. **P. communis** Trin. [*P. Phragmites* (L.) Karst.] REED.
Marshes; scarce. Mendon and Hamlin, *M. S. Baxter*. Bergen swamp, Genesee county. Wayne county.

473. EATONIA Raf.

1254. **E. Pennsylvanica** Gray. [*E. Pennsylvanica* (D. C.) A. Gray.]
Moist banks and borders of marshes; frequent.

1255. **E. Dudleyi** Vasey.
Moist bank of Genesee river, with *E. Pennsylvanica*, *J. B. Fuller*, 1862.

474. ERAGROSTIS Beauv.

1256. **E. reptans** Nees. [*E. hypnoides* (Lam.) B. S. P.]
Frequent in wet sand on the shore of lake Ontario and along the Genesee river.

1257. E. MAJOR Host. (*E. pœoides* var. *megastachya* Gray.)
Railroad yard, East Rochester, *Dr. C. M. Booth!* Roadside, Central avenue, Rochester, *J. B. Fuller*.

1258. E. PURSHII Schrader. [*E. Caroliniana* (Spreng.) Scribn.]
Railroad yard, East Rochester, *Dr. C. M. Booth!*

1259. **E. capillaris** Nees. [*E. capillaris* (L.) Nees.]
Brockport, *Prof. W. H. Lennon*, *M. S. Baxter*.

475. DACTYLIS L.

1260. D. GLOMERATA L. ORCHARD GRASS.
Fields, door-yards, waysides; common.

CYNOSURUS L.

—— C. CRISTATUS L., CRESTED DOG'S-TAIL GRASS, is occasionally spontaneous in the vicinity of Rochester.

476. POA L.

1261. P. ANNUA L. LOW SPEAR-GRASS.
Lawns, roadsides, fields; common.

1262. P. COMPRESSA L. WIRE-GRASS.
Fields, waysides, waste places, dry banks; common. Sometimes called *Canadian Blue Grass*.

1263. **P. serotina** Ehrh. [*Poa flava* L.] FOWL MEADOW-GRASS.
Wet meadows, low banks of streams and springy places; frequent.

1264. **P. pratensis** L. JUNE GRASS. KENTUCKY BLUE-GRASS.
Everywhere abundant.

1265. P. TRIVIALIS L. ROUGH-STALKED MEADOW-GRASS.
Low grass lands and marshes; not common.

1266. **P. sylvestris** Gray.
Rare. *Dr. C. M. Booth.*

1267. **P. debilis** Torr.
Irondequoit, *Dr. C. M. Booth!* Wayne county.

1268. **P. alsodes** Gray.
Woods on river banks and hillsides; infrequent.

477. GLYCERIA R. Br. [PANICULARIA Fabr.]

1269. **G. elongata** Trin. [*Panicularia elongata* (Torr.) Kuntze.]
Rare. *L. Holzer.*

1270. **G. nervata** Trin. [*Panicularia nervata* (Willd.) Kuntze.] FOWL MEADOW-GRASS.
Moist meadows, brooksides, marshy ground; common.

1271. **G. pallida** Trin. [*Panicularia pallida* (Torr.) Kuntze.]
Monroe county, *L. Holzer.* Wayne county, *E. L. Hankenson.*

1272. **G. grandis** Watson. (*G. aquatica* J. E. Smith.) [*Panicularia aquatica* (L.) Kuntze.] REED MEADOW-GRASS.
Low meadows and shallow slow streams; common.

1273. **G. fluitans** R. Br. [*Panicularia fluitans* (L.) Kuntze.]
Shallow water in slow streams, ditches, pools; infrequent.

478. FESTUCA L. FESCUE GRASS.

1274. **F. tenella** Willd. [*Festuca octoflora* Walt.]
Wooded bank of Irondequoit bay, Penfield, *Dr. C. M. Booth!* Wayne county.

1275. F. OVINA L. SHEEP'S FESCUE.
Bank of Genesee river, near the lower falls, and elsewhere. Occasionally on lawns.

1276. F. OVINA L. var. DURIUSCULA Koch. [*Festuca ovina duriuscula* (L.) Hack.] HARD FESCUE.
Sandy fields near Irondequoit bay, *Dr. C. M. Booth.* Sandy bank of Irondequoit bay, near Sea Breeze, *J. B. Fuller. L. Holzer. G. T. Fish.*

1277. **F. nutans** Willd.
Frequent in woods on the banks of Genesee river and elsewhere.

1278. F. ELATIOR L. TALL MEADOW FESCUE.
Low, rich grass land; common.

1279. F. ELATIOR L. var. PRATENSIS Gr. [*F. elatior pratensis* (Huds.) Hack.] MEADOW FESCUE.
Fields and waysides; common.

479. BROMUS L.

1280. **B. Kalmii** Gray.
Not common. Copses along the banks of Genesee river. Mendon, *G. T. Fish.* Adams Basin, *M. S. Baxter.*

1281. B. SECALINUS L. CHESS or CHEAT.
Fields and waste lands; common.

1282. B. MOLLIS L. [*B. hordeaceus* L.]
L. Holzer. Prof. W. H. Lennon.

1283. B. RACEMOSUS L. *L. Holzer.*

1284. **B. ciliatus** L.
River banks and ravines; common.

1285. **B. ciliatus** L. var. **purgans** Gray. [*B. ciliatus purgans* (L.) A. Gray.]
Common on rocky banks of the Genesee river.

1286. B. TECTORUM L.
Not common. Irondequoit, *Dr. C. M. Booth!*

480. *LOLIUM* L. DARNEL.

1287. L. PERENNE L.
Roadsides, Rochester. Wayne county.

1288. L. ITALICUM A. Br. [*L. perenne Italicum* (A. Br.) Scribn.]
Roadside, Rochester, *J. B. Fuller.*

1289. L. TEMULENTUM L. POISONOUS DARNEL.
Wayne county, *E. L. Hankenson.*

481. *AGROPYRUM* Gærtn. [AGROPYRON J. Gærtn.]

1290. **A. repens** Beauv. (*Triticum repens* L.) [*Agropyron repens* (L.) Beauv.]
COUCH, QUACK, QUITCH or QUICK GRASS.
Fields, roadsides and waste places; common.

1291. **A. caninum** Roem. & Schultes. (*Triticum caninum* L.) [*Agropyron caninum* (L.) Roem. & Schultes.]
River banks, dry ravine sides; frequent. Occasionally in swamps.

482. *HORDEUM* Tourn. [L.]

1292. H. JUBATUM L. SQUIRREL-TAIL GRASS.
Fields and roadsides, Irondequoit, *Dr. C. M. Booth.*

483. *ELYMUS* L. WILD RYE.

1293. **E. Virginicus** L.
River banks and ravines; frequent.

1294. **E. Canadensis** L.
River banks and shores; frequent.

1295. **E. Canadensis** L. var. **glaucifolius** Gray. [*E. Canadensis glaucifolius* (Willd.) Torr.]
Common on the banks of Genesee river, below Rochester.

1296. **E. striatus** Willd.
Monroe county, *L. Holzer.* Wayne county, *E. L. Hankenson.*

484. *ASPRELLA* Willd. [HYSTRIX Mœnch.]

1297. **A. Hystrix** Willd. (*Gymnosticum Hystrix* Schreb.) [*Hystrix Hystrix* (L.) Millsp.]
River banks and ravine sides, borders of woods; frequent.

GYMNOSPERMÆ.

CONIFERÆ.

485. PINUS Tourn. [L.]

1298. **P. Strobus** L. WHITE PINE.
Woods and hills; frequent.

1299. **P. rigida** Mill. PITCH PINE.
Dry hills and sandy banks; infrequent. Irondequoit. Brighton. Penfield. Webster.

486. PICEA Link.

1300. **P nigra** Link. (*Abies nigra* Poir.) [*Picea Mariana* (Mill.) B. S. P.] BLACK SPRUCE.
Scarce. Swamps at Mendon.

487. TSUGA Carriere.

1301. **T. Canadensis** Carr. (*Abies Canadensis* Michx.) [*Tsuga Canadensis* (L.) Carr.] HEMLOCK.
Swampy woods and river banks; common.

488. ABIES Link. [Juss.]

1302. **A. balsamea** Mill. [*A. Balsamea* (L.) Mill.] BALSAM FIR.
Reported only by *L. Holzer.*

489. LARIX Tourn. [Adans.]

1303. **L. Americana** Michaux. [*L. laricina* (Du Roi) Koch.] TAMARACK. AMERICAN LARCH.
Common in the larger swamps.

490. THUYA Tourn. [THUJA L.]

1304. **T. occidentalis** L. ARBOR VITÆ. WHITE CEDAR.
Rocky river banks, ravines and swamps; common.

491. JUNIPERUS L.

1305. **J. communis** L. COMMON JUNIPER.
Rare. Bank of the Genesee river, below the lower falls. Bank of Irondequoit bay, *G. T. Fish.*

1306. **J. Sabina** L. var. **procumbens** Pursh. [*J. Sabina* L.]
Bank of the Genesee river, *Bradley.* Caledonia, Livingston county. Abundant in Bergen swamp, Genesee county.

1307. **J. Virginiana** L. RED CEDAR.
Rare. Banks of Genesee river, Rochester. East bank of Irondequoit bay, Webster. Oak Orchard, Orleans county.

1308. J. VIRGINIANA L. var. PROSTRATA.
Abandoned nursery grounds on Prince street, Rochester.

492. TAXUS Tourn. [L.]

1309. **T. Canadensis** Willd. (*T. baccata* L. var. *Canadensis* Gray.) [*T. minor* (Michx.) Britton.] AMERICAN YEW.
River banks, ravine sides, hemlock woods and cold swamps.

CRYPTOGAMIA.

VASCULAR ACROGENS. [PTERIDOPHYTA.]

EQUISETACEÆ.

493. EQUISETUM L.

1310. **E. arvense** L. COMMON HORSETAIL.
Moist sandy or gravelly soil, railroad embankments, river banks and ravine sides; common.

1311. **E. sylvaticum** L.
Wet shady places; infrequent.

1312. **E. palustre** L.
Rare. Margin of Genesee river, near lake Ontario, *J. B. Fuller.*

1313. **E. limosum** L. [*E. fluviatile* L.]
Infrequent. Rochester, *Dr. C. M. Booth, J. B. Fuller.* Gates, *G. T. Fish.* Brockport, *M. S. Baxter.* Wayne county.

1314. **E. hyemale** L. SCOURING RUSH.
Moist or dry banks; common.

1315. **E. variegatum** Schleicher.
Frequent on the shore of lake Ontario.

1316. **E. scirpoides** Michx.
Wooded hillsides; not common. Mount Hope. Banks of Irondequoit creek and bay. Hopper's hill, Greece. Webster. Wayne county.

FILICES.

494. POLYPODIUM L.

1317. **P. vulgare** L. COMMON POLYPODY.
On rocks and roots of trees; infrequent. Four stations on the banks of Genesee river, between the lower falls and the rifle range. East side of Irondequoit bay, near the sand bar, *C. W. Seelye.* "The Gulf", Genesee county, *Miss F. Beckwith.* Holley, Orleans county, *Prof. W. H. Lennon.* Oak Orchard, *M. S. Baxter.* Cliffs on the eastern shore of Canandaigua lake, *C. W. Seelye.* Wayne county.

495. ADIANTUM L. MAIDENHAIR.

1318. **A. pedatum** L.
Rich moist woods, shady banks, ravine sides; common.

496. PTERIS L.

1319. **P. aquilina** L. COMMON BRAKE.
Thickets, hillsides, old fields; common.

497. WOODWARDIA J. E. Smith. CHAIN-FERN.

1320. **W. Virginica** Smith. [*W. Virginica* (L.) J. E. Smith.]
Abundant in a swamp at Mendon ponds. Adams Basin, *M. S. Baxter.*

498. ASPLENIUM L. SPLEENWORT.

1321. **A. Trichomanes** L.
Shaded cliffs; rare. Glen east of Float bridge, *Dr. C. M. Booth!* "The Gulf", Genesee county, *Miss Beckwith.* Holley, *Prof. Lennon.*

1322. **A. ebeneum** Ait. [*A. platyneuron* (L.) Oakes.]
Rare. Bank of Genesee river, *M. S. Baxter.* Near the Sea Breeze, Irondequoit, *C. W. Seelye.* Mendon, *M. S. Baxter.* Holley, *Prof. Lennon.*

1323. **A. angustifolium** Michx.
Rich woods and ravine bottoms; not common. Woods, east of Rochester, *C. W. Seelye.* Near Rochester, *Dr. C. M. Booth.* Dugway, *Mrs. M. E. Streeter.* Gates, *Geo. T. Fish.* Brockport, *M. S. Baxter.* Glen at Seneca point, Canandaigua lake, *C. W. Seelye.* Wayne county.

1324. **A. thelypteroides** Michx. [*A. acrostichoides* Swartz.]
Rich woods; common.

1325. **A. Filix-fœmina** Bernh. [*A. Filix-fœmina* (L.) Bernh.]
Moist rich woods; common.

499. CAMPTOSORUS Link.

1326. **C. rhizophyllus** Link. [*C. rhizophyllus* (L.) Link.] WALKING-LEAF.
Shaded rocks; not common. Brighton, *C. W. Seelye.* Gates, *G. T. Fish.* Bank of Genesee river and glen east of Float bridge, *Dr. C. M. Booth!* Ogden, *M. S. Baxter.* "The Gulf", Genesee county, *Miss M. E. Macauley, Miss F. Beckwith.* Holley, *M. S. Baxter.* Glen at Seneca point, Canandaigua lake, *G. T. Fish, C. W. Seelye.* Wayne county.

500. PHEGOPTERIS Fee. BEECH FERN.

1327. **P. polypodioides** Fee. [*P. Phegopteris* (L.) Underw.]
Rare. Irondequoit, *C. W. Seelye. L. Holzer.* Wayne county.

1328. **P. hexagonoptera** Fee. [*P. hexagonoptera* (Michx.) Fee.]
Open woods; common.

1329. **P. Dryopteris** Fee. [*P. Dryopteris* (L.) Fee.]
Scarce. Webster, Mendon, Hamlin, *M. S. Baxter.* Holley, Orleans county, *Prof. Lennon.* Wayne county.

501. ASPIDIUM Swartz. [DRYOPTERIS Adans.] SHIELD FERN.

1330. **A. Thelypteris** Swartz. [*Dryopteris Thelypteris* (L.) A. Gray.]
Moist or marshy ground; common.

1331. **A. Noveboracense** Swartz. [*Dryopteris Noveboracensis* (L.) A. Gray.]
Moist woods and moist shady places; common.

1332. **A. spinulosum** Swartz. [*Dryopteris spinulosa* (Retz) Kuntze.]
Dry or wet woods, and swamps; not uncommon.

1333. **A. spinulosum** Swartz var. **intermedium** D. C. Eaton. [*Dryopteris spinulosa intermedia* (Muhl.) Underw.]
Woods; common.

1334. **A. spinulosum** Swartz var. **dilatatum** Hooker. [*Dryopteris spinulosa dilatata* (Hoffm.) Underw.]
Charlotte, *C. W. Seelye. Dr. Anna H. Searing.*

1335. **A. Boottii** Tuckerm. (*A. spinulosum* var. *Boottii* Man.) [*Dryopteris Boottii* (Tuckerm.) Underw.]
Rare. Swamp near Scottsville, *M. S. Baxter.*

1336. **A. cristatum** Swartz. [*Dryopteris cristata* (L.) A. Gray.]
Moist and marshy woods and thickets; not uncommon.

1337. **A. cristatum** Swartz var. **Clintonianum** D. C. Eaton. [*Dryopteris cristata Clintoniana* (D. C. Eaton) Underw.]
Low rich woods; not uncommon.

1338. **A. Goldianum** Hook. [*Dryopteris Goldieana* (Hook.) A. Gray.]
Rich moist woods and shady places; scarce.

1339. **A. marginale** Swartz. [*Dryopteris marginalis* (L.) A. Gray.]
Dry woods and rocky banks and hillsides; common.

1340. **A. acrostichoides** Swartz. [*Dryopteris acrostichoides* (Michx.) Kuntze.] CHRISTMAS FERN.
Common in rocky woods. Var. *incisum* Gray is found in Webster by *M. S. Baxter.*

502. CYSTOPTERIS Bernhardi. BLADDER FERN.

1341. **C. bulbifera** Bernh. [*C. bulbifera* (L.) Bernh.]
Rocky walls and bottoms of shaded ravines, shaded river banks and cold swampy woods; abundant.

1342. **C. fragilis** Bernh. [*C. fragilis* (L.) Bernh.]
Common on shaded cliffs, rocky banks, shaded hillsides and banks of brooks. Var. *dentata* is at Adams Basin, *M. S. Baxter*; also reported by *Dr. Searing.* Var. *angustata* occurs at Ogden, *C. W. Seelye.*

503. ONOCLEA L.

1343. **O. sensibilis** L.
Moist fields and thickets; common. The so-called var. *obtusilobata* occurs in Webster, *M. S. Baxter*; also reported by *G. T. Fish.*

1344. **O. Struthiopteris** Hoffm. (*Struthiopteris Germanica* Willd.) [*Onoclea Struthiopteris* (L.) Hoffm.] OSTRICH FERN.
Rich moist soil, in shaded places; not rare.

504. DICKSONIA L'Her.

1345. **D. pilosiuscula** Willd. (*D. punctilobula* Kuntze.) [*D. punctilobula* (Mx.) A. Gray.] HAY-SCENTED FERN.
Rare. Vicinity of Rochester, *Dr. Booth.* Brockport, *M. S. Baxter.* Holley, *Prof. W. H. Lennon.* Ontario, Wayne county, *Geo. T. Fish.*

505. OSMUNDA L.

1346. **O. regalis** L. ROYAL FLOWERING FERN.
In dry or swampy ground, in the open or in light shade; not uncommon.

1347. **O. Claytoniana** L.
Low grounds, in the open or in shade; common.

1348. **O. cinnamomea** L. CINNAMON FERN.
In similar situations and as common as the last mentioned. Var. *frondosa* is found at Adams Basin, *M. S. Baxter.*

OPHIOGLOSSACEÆ.

506. BOTRYCHIUM Swartz.

1349. **B. lanceolatum** Angstroem. [*B. lanceolatum* (S. G. Gmel.) Angstroem.]
Rare. Holley, Orleans county, *Prof. W. H. Lennon.*

1350. **B. matricariæfolium** A. Braun.
Rare. Henrietta, *J. B. Fuller.* Webster, *M. S. Baxter.* Holley, Orleans county, *Prof. W. H. Lennon.* Wayne county.

1351. **B. ternatum** Swartz. [*B. ternatum* (Thunb.) Swartz.]
Rare. Holley, Orleans county, *Prof. W. H. Lennon.*
Var. *intermedium* (*B. lunarioides* Man.), Adams Basin, *M. S. Baxter* Woods bordering Bergen swamp, Genesee county, *Dr. C. M. Booth* and *G. T. Fish!* Wayne county.
Var. *obliquum*, Adams Basin, *M. S. Baxter.* *Dr. C. M. Booth.*
Var. *dissectum*, Webster, *M. S. Baxter.*

1352. **B. Virginianum** Swartz. [*B. Virginianum* (L.) Swartz.]
Rich woods; common.

507. OPHIOGLOSSUM L. ADDER'S TONGUE.

1353. **O. vulgatum** L.
Rare. Buck pond, *Dr. A. H. Searing.* Henrietta, *Dr. C. M. Booth.* Adams Basin, *M. S. Baxter.*

LYCOPODIACEÆ.

508. LYCOPODIUM L. CLUB MOSS.

1354. **L. lucidulum** Michx.
Cold woods, ravine sides, shady margins of ponds, etc.; frequent.

1355. **L. obscurum** L. var. **dendroideum** Man. (*L. dendroideum* Michaux.) [*L. obscurum* L.]
Rare. Near Rich's mills, Penfield, *Dr. C. M. Booth!* Gates, *G. T. Fish.* Webster, *M. S. Baxter.*

1356. **L. clavatum** L. COMMON CLUB MOSS.
Dry woods; common.

1357. **L. complanatum** L. GROUND PINE.
Woods on sandy hills and slopes; frequent.

SELAGINELLACEÆ.

509. SELAGINELLA Beauv.

1358. **S. rupestris** Spring. [*S. rupestris* (L.) Spring.]
Rare. Dry exposed rock, Penfield, *M. S. Baxter.*

SALVINIACEÆ.

510. AZOLLA Lam.

1359. **A. Caroliniana** Willd.
In all the side-waters of lake Ontario, throughout the northern border of our district. "Common near the shore, but not observed at any distance from the lake", *John E. Paine.* Gates, *Geo. T. Fish.*

Bibliography.

1687.—Denonville's Report of his Expedition to the Genesee Country. Doc. Hist. State of New York, Vol. I. Albany, 1849.

He describes the country, the forest growth, the orchards and the cultivated fields, and gives details of the great quantity of corn destroyed.

1715.—Account of the Expedition of Denonville as related by the Baron La Hontan in his "Travels in America." Collections of the New York Historical Society. Second Series, Part I. New York, 1848.

Speaks of marching through immense forests of lofty trees, and of the woods abounding in oak, walnut and wild chestnut trees.

1755.—Memoir upon the Late War in North America between the French and English. By M. Pouchot. Trans. by F. B. Hough. Roxbury, 1866.

Describes the finding of ginseng by Father Lafitan, and says that it is most frequently found in the country of the Five Nations. Describes the oaks on the banks of the "Casconchiagon" (Genesee river).

1785.—The North American Sylva. By F. A. Michaux. With Notes by J. J. Smith. Philadelphia, 1855.

The author, who traveled through this country from 1785 to 1796, making a special study of the trees, makes numerous mention of the trees of the Genesee region. Of the iron-wood (*Carpinus ostrya*) he says: "I have nowhere seen it more common nor more vigorous than in Genesee, near Lake Ontario and Lake Erie." "The white elm (*Ulmus Americana*) appears to be the most multiplied and of the loftiest height between the 42d and 46th degrees of latitude, which comprises the provinces of Lower Canada, New Brunswick and Nova Scotia, the north-eastern section of the United States and Genesee in the State of New York." "Basswood (*Tilia Americana*) is most abundant in Genesee. In some districts, particularly between Batavia and New Amsterdam, it frequently constitutes two-thirds and sometimes the whole of the forests." "The mossy-cup oak (*Quercus oliviæformis*) I have observed only in the State of New York, on the banks of the Hudson, above Albany, and in Genesee, where it is so rare that it has hitherto received no specific name." He says that *Juglans porcina* (pignut) is not found in the Genesee country, but our collectors have proved that assertion to be incorrect. He makes special mention of the sugar maple being common only in Genesee and the upper part of Pennsylvania. He calls particular attention to the fact that the black sugar maple (*Acer nigrum*) has hitherto been confounded by botanists with the sugar maple, and says that "it forms a large part of the forests of the Genesee. He mentions the coffee tree (*Gymnocladus Canadensis*) as being found in that part of Genesee which borders on Lake Ontario and Lake Erie. Of *Populus Canadensis*, he speaks particularly of its growing on the banks of the Genesee, and that the trees are seventy or eighty feet in height and three or four feet in diameter. He mentions white ash, wild

cherry, white beech, shellbark hickory and black walnut, as being abundant in the Genesee country.

1792.—Reflections offertes aux Capitalistes de l'Europe. By Capt. Van Pradelles. Amsterdam, 1792.

This author gives a glowing description of the Genesee country and its advantages, chief among which he places the forests of sugar maple trees, speaking of a process discovered two years previously by which it was possible to obtain, from the syrup of the maple, sugar equal to that produced from the cane, and stating that maple trees were so abundant as to furnish all the sugar needed for home consumption in the United States and leave a surplus of thousands of tons for export. The pamphlet is accompanied by a map showing the position of the Genesee country and indicating the regions most abounding in sugar maples.

1792.—Description of the Country between Albany and Niagara in 1792. Doc. Hist. State of New York, Vol. II. Albany, 1849.

The writer describes the famous Genesee flats, speaking of the remarkably fertile soil, quite clear of trees, producing grass ten feet high.

1795.—Historical, Geographical, Commercial and Philosophical View of the American United States, etc., etc. By W. Winterbotham. London, 1795.

1795.—Travels through the United States of America, the Country of the Iroquois and Upper Canada, in the years 1795, 1796, and 1797. By the Duke de la Rochefoucault Liancourt. 2 Vols. London, 1799.

The author refers to the production of large quantities of maple sugar by the white settlers. He also speaks of the great fertility of the region, the great size of the trees, and the variety of shrubs and flowers.

1799.—Description of the Settlement of the Genesee Country in the State of New York. By Capt. Charles Williamson. Doc. Hist. State of New York, Vol. II. Albany, 1849.

This writer speaks of the uplands as being timbered chiefly with hickory, oak and walnut, and the intervales with elm, basswood, sugar-tree, etc. He also speaks of the open Genesee flats, not even encumbered with a bush, but covered with extremely tall grass.

1800.—"Holland Land Company West Geneseo Lands-Information." Holland Purchase. By O. Turner. Buffalo, 1849.

A handbill describing the lands of the company, mentions trees growing near Geneseo: black and white oak, hickory, poplar, chestnut, wild cherry, butternut, dogwood, basswood or lynn, sugar tree, white ash, cucumber and black walnut.

1800.—Visit to the Falls of Niagara in 1800. By John Maude. London, 1826.

The author speaks of the Genesee flats being covered with grass ten

feet high, with no trees. Oak the principal timber near New Hartford (Canawaugus.) Along the Genesee river above the falls at Rochester were thick woods of beech, basswood, sugar maple, tulip tree, oak, hickory, chestnut, butternut, black walnut, dogwood, ironwood, and two or three hemlock pines. He observed white pines on the east side of the river, and could see the tops of pines which lined the shores of lake Ontario. He speaks of the sugar maple abounding more than any other tree in the Genesee country.

1800.—An Account of the Soil, Growing Timber, and other productions of the land in the countries situated in the back parts of the States of New York and Pennsylvania, in North America; and particularly the lands in the County of Ontario, known by the name of the Genesee Tract, lately located, and now in the progress of being settled. (Report of the Deputy Marshal of New York on the preëmption lands in the County of Ontario, December, 1800.) Doc. Hist. State of New York, Vol. II. Albany, 1849.

Among the peculiar advantages of this region the report claims: The uncommon excellence and fertility of the soil; the superior quality of the timber, and the advantages of easy cultivation in consequence of being generally free from underwood; the abundance of grass for cattle, in the woods and on the extensive meadow grounds upon the lakes and rivers; the vast quantities of the sugar maple tree in every part of the tract; the great variety of other fine timber, such as oak, hickory, black walnut, chestnut, ash of different kinds, elm, butternut, basswood, poplar, pines, and also thorns of prodigious size; the variety of fruit trees, and also smaller fruits, such as mulberries, grapes of different kinds, raspberries, blackberries, huckleberries, wild gooseberries and strawberries in vast quantities, also cranberries and black haws.

The report also speaks of the extensive ranges of meadow grounds on the Genesee flats, on which there was little or no underwood and which are represented as being covered with a growth of coarse grass, luxuriant beyond description and very fit for hay.

1803.—Le Pour et le Contre, ou Avis à ceux qui se proposent de passer dans les États-Unis d'Amerique. Suivi d'une déscription du Kentucky et du Genesy, deux des nouveaux établissemens les plus considérables de cette partie du nouveau monde. Par Louis Bridel. Paris, 1803.

The writer describes the Genesee country, comparing it with Kentucky; speaks of the fertility of the soil and the enormous size of the trees, one black walnut measuring 22 feet in circumference, and near it a sycamore measuring 44 feet. Speaks of a bundle of grass, gathered by chance in the forest and sent to Amsterdam, which measured 4½ feet in height. He says the forests were made up of fir, oak, elm, birch, black walnut, chestnut, cherry, mulberry and apple trees. Says that the sugar maple was very common, and speaks of the sumac as being peculiar to this part of the country.

1804.—A Description of the Genesee Country in the State of New York. By Robert Munro. Doc. Hist State of New York, Vol. II. Albany, 1849.

The author mentions the most common and the most useful of the forest trees, describing somewhat at length the characteristic features of the soil upon which particular species grow. He speaks of the hemlock, cucumber tree, white poplar, white and black birch, turmeric tree, spruce pine, locust tree, prickly ash, spice wood, hazelnut, willow and alder as being scarce. Among the plants mentioned are sassafras, ginseng, sarsaparilla, snakeroot, spikenard, mandrake, etc. The Genesee flats are mentioned as cleared of timber for several thousand acres, and covered with very high and thick grass.

1804.—A View of the Present Situation of the Western Parts of the State of New York, called the Genesee Country, etc., etc. (Author unknown.) Fredericktown, 1804. 23 pp.

This pamphlet mentions the most common forest trees and their indication regarding character of the soil, and names a few of the noted shrubs and herbs used as food or medicine.

1809.—Map of the Military Lands of the State of New York. Doc. Hist. State of New York, Vol. I. Albany, 1849.

Gives location of the "Big Tree" on the Genesee river.

1816.—Travels in Canada and the United States in 1816 and 1817. By Lieut. Francis Hall. London, 1818.

The writer describes Rochester, saying that the vicinity is still an unbroken forest, consisting of oak, hickory, ash, beech, bass, elm and walnut. Speaks of a black walnut tree "betwixt the town and the great fall, 24 feet in its girth". Speaks of Allen's creek, near Caledonia, with its banks adorned with natural groves and copses, in which he observed the "candleberry myrtle" in great abundance.

1816.—Travels through the Western Country in the Summer of 1816. By David Thomas. Auburn, 1819.

This author mentions many of the trees and plants of this region, and notes the relations of the geological features to the distribution of the flora. We quote some of his observations. "As we approach the Genesee river oak and chestnut appear on the hills, but in the moist rich lands to the eastward the latter is very rare. Fences of considerable extent have been made from white cedar, which is procured in the swamps. It is not that of West Jersey (*Cupressus thyoides*), which it greatly resembles in the grain of the wood, but the *Thuya occidentalis*". "The road was bordered by many detached patches of poisonous hemlock (*Cicuta maculata*)". He speaks of the stunted white oaks growing on the limestone foundation between the Genesee river and Caledonia, and notes that two miles beyond the latter place beech and maple become the principal timber. He speaks of noticing the papaw (*Annona triloba*) eight miles from Erie, and says that he had not discovered it in any other part of the State of New York; from which we suppose that he

did not visit the towns of Greece and Parma, in this county, where it is found. He speaks of first noticing the colombo root (*Frasera Walteri*) on the oak plains west of the Genesee river.

1818.—A Tour from the City of New York to Detroit in the Michigan Territory. By William Darby. New York, 1819.

The writer describes the country between Canandaigua and Batavia, by way of Avon. He speaks of the great fertility of the soil, and mentions that oak was the prevalent timber after passing the Genesee flats. Also mentions sugar maple, linden, elm, white hickory, ash and hemlock.

1820.—Remarks on the Environs of Carthage Bridge near the mouth of the Genesee River. By Dr. John I. Bigsby, of the Medical Staff of the British Army in Canada. Amer. Jour. of Science, Vol. II. New Haven, 1820.

The writer speaks of the cedar, hemlock, pine, oak and beech trees on the banks of the river, near the bridge.

1821.—Travels in New England and New York. By Timothy Dwight, S.T. D., LL. D. 4 Vols. New Haven, 1821.

The author notes the growth of hemp, wheat, etc., and the maple and "oak plains", apparently on the corniferous limestone.

1822.—Letters on the Natural History and Internal Resources of the State of New York. By Hibernicus (DeWitt Clinton). New York. 1822.

Speaks of the curled or birdseye maple, black walnut and wild cherry as being plenty and valuable for the manufacture of furniture, and makes frequent reference to the trees of the region around Canandaigua.

1823.—Observations on the Lake Fevers and other Diseases of the Genesee Country in the State of New York. By Edward G. Ludlow. New York, 1823.

Describes the marshes of Braddock's and Irondequoit bays, and says: "Numerous medicinal plants, whose virtues have been tested, are found in this region, and are much used, especially in those parts of the country where the scarcity or high price of pharmaceutical preparations render it necessary to resort to the less expensive simples of nature." Speaks of the barks of the *Liriodendron Tulipifera, Cornus florida* and *Prinus verticillata* being used as substitutes for cinchona.

1824.—Life of Mary Jemison. By James E. Seaver. Batavia, 1824.

Speaks of the banks of the Genesee river being covered with white and Norway pines. Ginsing was plenty and commanded a high price.

1830.—View taken from the Upper Falls of the Genesee River. By D. Wadsworth. Amer. Jour. Science, Vol. XVIII. New Haven, 1830.

The writer speaks of the gigantic evergreens growing on the river banks at Portage.

1831.—Annals of Tryon County. By William W. Campbell. New York, 1849.

The author makes frequent mention of the forest trees of the Genesee region. Describes the Genesee flats, with scarcely a tree to be seen over the whole extent and with grass ten feet high. Calls it the garden of the State. The forests beyond the flats were mostly white oak.

1832.—The Sylva Americana. By D. J. Browne. Boston, 1832.

The author makes numerous references to the trees of the Genesee region.

1836–1850.—Annual Reports of the Regents of the University of the State of New York. Albany, 1836–1850.

In every volume mention is made of the plants of this vicinity, under heads of "Progress of Vegetation", "Journal of Occurrences", "Catalogue of Plants and Time of Flowering", "Botanical Calendar", "Calendar of Flowering", etc.

1837.—Second Annual Report of the Fourth Geological District of New York. By James Hall. Albany, 1837.

Dr. Hall speaks of there being very little evergreen timber along the river banks between Moscow and Rochester, but in going south a short distance from the former place the pines and hemlocks and their associates are more frequent. He speaks of the trees growing in the swamps near the lake shore as being commonly black ash, tamarack and cedar, while those on the ridges near the lake are oak, elm, beech and buttonwood. Also of the sandy hills of Perinton being covered with a growth of shrub oak and whortleberries.

1838 —Sketches of Rochester. By Henry O'Reilly. Rochester, 1838.

The author speaks of the geological formations of Western New York, and of the native forests of the Genesee valley serving as almost unfailing indications of the soil beneath. He mentions the oak, elm, beech, maple, pine, hemlock and birch, and tells upon what kinds of soil they may be looked for.

1838.—Life of Brant.' By William L. Stone. Buffalo, 1838.

Speaks of the fertility of the Genesee flats, which were cleared for miles at the time of Sullivan's raid, and covered with orchards and fields of corn. Mentions some of the trees of the region.

1839.—Report of Dr. John Torrey, of the Botanical Department of the Geological Survey. Ann. Rept. of the State Geologist. Albany. 1839.

Frequent mention of species of plants found in this vicinity, with names of collectors.

1840.—Fourth Annual Report of the Survey of the Fourth Geological District. By James Hall. Albany, 1840.

Mention is made of the forest growth in different parts of the county.

1841.—Sketches of the Life and Adventures of Moses Van Campen. By John Niles Hubbard. Dansville, 1841.

The writer describes the Genesee flats and country beyond, with here and there a beautiful grove, orchards of apple and peach trees, and wide and flourishing corn fields.

1842 —Catalogue of Plants and their Time of Flowering in and about the City of Rochester, for the year 1841. By Dr. Chester Dewey. Fifty-fifth Ann. Rept. Regents of the University, State of New York. Albany, 1842.

1843.—Flora of the State of New York. By John Torrey, M. D. Albany, 1843.

Frequent mention is made of rare plants found in this vicinity, with names of the collectors, and other particulars.

1843.—Botanical Calendar kept at Rochester by Dr. Chester Dewey. Fifty-sixth Ann. Rept. Regents of the University, State of New York. Albany, 1843.

1843.—Natural History of New York, Part V. Agriculture, Vols. I, II. By E. Emmons. Albany, 1843.

The author, describing Plate III, A View from Mt. Hope, says: "The city appears in the back part of the middle ground. In the open fields stand the superb elms of the deep and rich clay soil peculiar to this district. They are the only remains of the great and noble forests which have fallen before the axe of civilization in the last half century. They run up an unbroken shaft near one hundred feet, where they at once form a heavy dense head. They are in strict contrast with the elms of a second growth in the valleys of the Mohawk and Hudson, whose trunks are thickly covered with slender limbs, and their heads formed of long, pendulous branches.

"For magnificent specimens of the elm the valleys of the Genesee and the Black river in Jefferson county are surpassed by no other parts of the world. Hundreds of elms may be seen in either of these sections of country exceeding by far the famous Pittsfield Elm in Berkshire, Mass."

1848.—The Meadow Park at Geneseo. By A. J. Downing. The Horticulturist, Vol. III, No. 4. Albany, 1848.

The writer describes the great oak, "Big Tree", under which the first treaty was signed between the Indians and the first settlers of Geneseo. At the time of writing, 1848, the old tree was healthy and green. He also speaks of other magnificent specimens of oak and elm trees to be seen in the Meadow Park, and of the remains of a former rival of the "Big Tree". Of the latter he says: "Not far from it stands the stump of a contemporary, destroyed a few seasons before by the elements. The annual rings of its trunk tell the story of nine hundred years' growth."

1851.—Phelps and Gorham Purchase. By O. Turner. Rochester, 1851.

The author speaks of the magnificent forest trees of the valley of the

Genesee, and of the oak openings and pine plains of the towns east of the river. In Rochester, in 1817, along where St. Paul street now is, there was a dense forest of hemlocks, spruce and cedar. Along the river and Honeoye creek were large patches of rushes. Mention is also made of apple trees, the seeds of which were planted by the Jesuit missionaries.

1851.—Notice of some large Trees in Western New York. By S. B. Buckley. Amer. Jour. of Sc., Second Series, Vol. 13. New Haven, 1852.

Describes some large trees on the Genesee flats, and speaks particularly of the "Big Tree" near Geneseo.

1852.—Large Trees in the State of New York. The Horticulturist. Albany, 1852.

The writer (name not given) describes some of the large trees of the Genesee valley, quoting the article by S. B. Buckley in the American Journal of Science, Second Series, Vol. 13, and also mentions some large sycamores in the township of Sodus, Wayne county, several of which were from 14 to 16 feet in diameter.

1852.—Forest Trees of America. By James H. Watts. The Horticulturist, Vol. VII. Albany, 1852.

The writer says: "I have ever regretted that so ruthless a disposition was made by the early settlers of Rochester of the beautiful forest trees which abounded here. The elm, maple, chestnut, oak, walnut and beech grew in abundance, and were mostly cut down by those whose province it was to clear away the forest." He mentions a large elm then standing on South Clinton street as being a very fine specimen, and expresses the hope that it may long be spared, but it has since his writing been cut down.

1863.—Preliminary List of the Plants of Buffalo and Vicinity. By G. W. Clinton. Rept. of Regents. Albany, 1864.

Plants found in Rochester, Caledonia and Bergen are mentioned.

1864–1894.—Annual Reports of the New York State Museum of Natural History. Albany, 1864–1894.

Frequent mention is made of plants of this vicinity, with names of collectors, donors of specimens, etc., etc.

1864.—Catalogue of Plants found in Oneida County and Vicinity. By John A. Paine, Jr. Rept. of Regents. Albany, 1865.

Plants found in Monroe county are frequently mentioned.

1867.—Gray's Manual of Botany. Fifth Edition. By Asa Gray. New York, 1867.

Mention is made of plants in this vicinity, with names of collectors.

1871.—Pioneer History of Orleans County, N. Y. By Arad Thomas. Albion, 1871.

In the reminiscences of the early settlers frequent mention is made of the wild fruits of the Genesee region: strawberries, cranberries, gooseberries,

blackberries and raspberries. The mandrake is also mentioned. Butternut, chestnut, beech, walnut, hemlock, basswood, black ash and oak composed the primitive forest. Speaking of the forest near Oak Orchard creek, one of the pioneers says: "The dense forest, composed of large, sturdy oaks, extended as far as the eye could see, east and west, on the south side of the Ridge road. On the north side the forest was still more dense, and was composed of a greater variety of timber."

1871.—The Tourist's Guide through the Empire State. By Mrs. E. S. Colt. Albany, 1871.

The author gives a description of the "Big Tree", and the date when it was swept away by a great flood, November, 1857.

1873.—The Longevity of Trees. By Elias Lewis. Pop. Sc. Monthly, Vol. III, July, 1873.

Speaking of noted trees, the writer says: "The Wadsworth Oak, at Geneseo, New York, is said to be five centuries old, and 27 feet in circumference at the base."

1876.—A History of Livingston County, N. Y. By L. L. Doty. Geneseo, 1876.

Reference is made to the elms and oaks on the banks of the Genesee river; to the dense forests and impassable marshes; and to the wild fruits—plums, grapes and cranberries. Quotes Col. Hubbard, describing the Genesee flats as containing not less than 6,000 acres, not having a bush standing, but filled with grass considerably higher than a man. Speaks of the "oak openings" near Caledonia, and the great oak near Geneseo.

1877.—Frontenac and New France under Louis XIV. By Francis Parkman. Boston, 1878.

Describing the expedition of Denonville against the Senecas, he speaks of the open forests of oaks, the tangled growth of beech trees, and the rank grass, waist-deep, of the intervales.

1877.—History of Monroe County, N. Y. By W. H. McIntosh.

Contains many references to the early forest growth.

1883.—A Catalogue of the Native and Naturalized Plants of the City of Buffalo and Vicinity. By David F. Day. Buffalo, 1883.

Frequent mention is made of plants found in Rochester, Caledonia, Bergen, etc.

1884.—Rochester, a Story Historical. By Jane Marsh Parker. Rochester, 1884.

The author mentions oak, chestnut, hickory, black walnut and whitewood as the most common trees in the primitive forest where the city of Rochester now stands. Also mentions a grove of sycamores on an island in the river, near the present dam, and an old sycamore tree which served as a landmark to the helmsman in ferrying across the river.

1884.—History of the City of Rochester. By William F. Peck. Syracuse, 1884.

Frequent mention is made of the primitive forest growth. George H. Harris, in one of the introductory chapters, says: "The town of Irondequoit, north of the ridge, was known as the 'pine barrens' to the early settlers, who cleared it of a heavy growth of pine trees, many of which stood upon the top of the bluff and over the ancient cemetery sixty years ago."

1884.—Report on the Forests of North America. By Charles S. Sargent. Tenth Census of the United States, Vol. IX. Washington, 1884.

Mentions trees growing in this region, naming particularly *Asimina triloba* (papaw) as being in Monroe county, and *Quercus prinus* (chestnut oak) in the valley of the Genesee. Speaks of the Wadsworth Oak, near Geneseo, as over three meters in diameter.

1888.—An Historic Elm. The Story of the Great Elm on the Markham Estate. By Geo. H. Harris. Rochester Democrat and Chronicle, May 13, 1888.

The writer describes an old elm on the Markham estate in the town of Rush, Monroe county. Says it was for many years a conspicuous landmark in the Genesee valley, and an important natural feature well known to and venerated by the Indians. For nearly a hundred years it had been known as the Markham Elm. The trunk, at the smallest place below the branches, was a little over 11 feet in diameter; its circumference just below the branches was 38 feet; three feet above the ground it measured 45 feet. At noon it shaded an acre of ground. The limbs were remarkably long and slender, the ends hanging down like ropes of trailing vines.

1890–1896.—Silva of North America. By Charles Sprague Sargent. Boston, 1890–1896.

Mentions trees of this region. Says of *Acer barbatum*, or black maple, that it was first noticed by the younger Michaux on the banks of the Genesee river, where it formed a forest of considerable size. Speaks of *Hicoria laciniosa* (*Carya sulcata*) as not rare in the valley of the Genesee river, and of the nuts being sold in the markets of Geneseo under the name of "king nut". Speaks of the "Wadsworth Oak", which grew on the bottom lands of the Genesee river, on the Wadsworth estate, a mile from Geneseo, as being the largest specimen of *Quercus platanoides* (*Q. bicolor*) of which a record has been preserved, and says: "In 1851, the short trunk, which varied little in size between the ground and the branches, had an average circumference of 27, with a minimum circumference of 24 feet." Mentions *Quercus prinus* as being found in the valley of the Genesee.

1890.—Report of the Botanical Section of the Rochester Academy of Science for 1889. By Mrs. J. H. McGuire, Recorder. Proc. Roch. Acad. of Sci., Vol. I. pp. 26–28.

1890.—The Fungi of Western New York. By Charles E. Fairman. Proc. Roch. Acad. Sci., Vol. I, pp. 44–54.

1891.—Root-foods of the Seneca Indians. By George H. Harris. Proc. Roch. Acad. Sci., Vol. I, pp. 106–117.

1891.—Report of the Botanical Section of the Rochester Academy of Science for 1890. By Mrs. J. H. McGuire, Recorder. Proc. Roch. Acad. of Sci, Vol. I, pp. 119–123.

1891.—Jeffersonia diphylla, and its occurrence near Rochester. By Charles Wright Dodge. Pro. Roch. Acad. Sc., Vol. I, p. 175.

1891.—A List of the Indigenous Ferns of the Vicinity of Rochester, with notes. By Charles W. Seelye. Proc. Roch. Acad. Sci., Vol. I, pp. 186–197.

1892.—Notes on the Aboriginal Terminology of the Genesee River. By George H. Harris. Publications of the Rochester Historical Society. Rochester, 1892.

1892.—Rudbeckia hirta. Meehan's Monthly, Vol. II, pp. 165, 166. Philadelphia, 1892.

1892.—Report of the Botanical Section of the Rochester Academy of Science for 1891. By Mrs. J. H. McGuire, Recorder. Proc. Roch. Acad. of Sci., Vol. II, pp. 44–48.

1893.—Hymenomyceteæ of Orleans County, New York. By Charles E. Fairman. Proc. Roch. Acad. Sci., Vol. II, pp. 154–167.

1893.—Variations of Ray-flowers in Rudbeckia hirta. By Florence Beckwith. Proc. Roch. Acad. Sci., Vol. II, pp. 170, 171.

1893.—Report of the Botanical Section of the Rochester Academy of Science for 1892. By Mrs. J. H. McGuire, Recorder. Proc. Roch. Acad. of Sci., Vol. II. pp. 176–180.

1893.—Blephilia ciliata in Western New York. By Elias T. Durand. Torrey Bulletin, Vol. XX, 1893.

1894.—Report of the Botanical Section of the Rochester Academy of Science for 1893. By Mrs. J. H. McGuire, Recorder. Proc. Roch. Acad. of Sci., Vol. II, pp. 237–243.

1894.—Our Trees. By C. C. Laney. Roch. Dem. & Chron., June, 1894.

1895.—The Flora of Long Pond. By Anna H. Searing. Proc. Roch. Acad. Sci., Vol. II, pp. 297–300.

1895.—A List of Trees and Shrubs growing spontaneously in Seneca Park. By J. B. Fuller. Roch. Dem. & Chron., Aug. 31, 1895.

CORRECTIONS AND INSERTIONS.

Page 17. In comparative table, under head of Monroe, read Carex 102.
Page 18. 10th line from bottom, for 1309 read 1314.
Page 19. *Plants common to the Monroe and Cayuga Floras.* Add Iris Pseudacorus, Carex laxiflora var. striatula, C. utriculata var. minor, C. virescens var. costata.
Page 20. *Plants common to Monroe and Buffalo Floras.* Add Eragrostis Purshii.
Page 22. *Plants common to the Cayuga and Buffalo Floras.* Strike out Juncus Canadensis var. brachycephalus.
Page 22. *Plants peculiar to the Monroe Flora.* Add Mentha citrata, Carex gracillima × C. arctata, C. granularis var. Haleana, C. tribuloides var. Bebbii. Strike out Lemna perpusilla, Andropogon Virginicus, Eragrostis pilosa.
Page 24. *Plants peculiar to the Cayuga Flora.* Strike out Iris Pseudacorus, Carex laxiflora var. blanda, C. utriculata var. minor, C. virescens var. elliptica.
Page 26. *Plants peculiar to the Buffalo Flora.* Strike out Eragrostis Purshii.
Page 46. 67. For [*A. glabra* L] read [*A. glabra* (L.) Bernh.]
Page 47. 76. For McM. read MacM.
Page 48. Following 89 insert—
— L. SATIVUM L., GARDEN CRESS. In waste places occasionally.
Page 48. 94. Read **L. minor** Man. ed. 6, in part; not L. [*L. intermedia* Leggett.] and omit SMALLER PINWEED.
Page 51. Genus 60. For *SPERGULARIA* read *SPERGULA*.
Page 56. Following 203, for — T. INCARNATUM, etc., read—
203*a*. T. INCARNATUM, etc., and add— Frequent, 1896.
Page 61. 276. For [Prince.] read [*F. Virginiana Illinoensis* Prince.]
Page 63. 313. **S. Pennsylvanica.** Add locality— Mendon ponds.
Page 65. Before genus *138. LYTHRUM* L. insert Order— LYTHRACEÆ.
Page 68. 376. Add localities— Scottsville and Rich's mills.
Page 70. 403. Read **L. borealis** Gronov. [*L. borealis* L.]
" " 404 and 412. For McM. read MacM.
" " 413. **H. cœrulea.** Add locality— Hemlock lake.
Page 72. 433. For D. SYLVESTRIS read D. SYLVESTRIS.
Page 74. 466. Read **A. sagittifolius** Willd. [*A. sagittæfolius* Wedem.]
Page 79. Genus 217. For *CHICORIUM* read *CICHORIUM*.
Page 81. 572. For [*S. asper* (L.) Vill.] read [*S. asper* (L.) All.]
Page 83. 602. For *Azalia* read *Azalea*.
Page 85. 638. For *Synanchum* read *Cynanchum*.
Page 87. 654. **C. Virginicum.** Add locality— Mendon, *Mrs. J. H. McGuire!*
" " 657. Read **M. Virginica** DC. [*M. Virginica* (L.) D. C.]
Page 89. 689. Read **L. Canadensis** Dumont. [*L. Canadensis* (L.) Dumont.]
Page 90. Following 706, for — V. CHAMÆDRYS, etc., read—
706*a*. V. CHAMÆDRYS, etc., and add locality— East ave., Rochester.
Page 92. 723. For A. Wallr. read Wallr.
Page 93. 744. For Monroe avenue read South Clinton street.
" " 747. Read **P. incanum** Michx. [*Kœllia incana* (L.) Kuntze.]
Page 108. Insert—
955*a*. I. PSEUDACORUS L. EUROPEAN YELLOW IRIS.
Well established near Shortsville, Ontario county, *Mrs. E. O. Cartwright*, Canandaigua.
Page 112. Insert—
1006*a*. **J. Canadensis** J. Gay, var. **brachycephalus** Engelm.
Bergen swamp, Genesee county, *M. S. Baxter*.
Page 118. Insert—
1101*a*. **C. Schweinitzii** Dewey.
Rare. Wayne county, *E. L. Hankenson*.
Page 127. Genus 471. For *ELUSINE* read *ELEUSINE*.

INDEX TO ORDERS AND GENERA.

Dr. George W. Goler read a paper entitled:

SMALL POX AND THE PRESENT STATUS OF THE VACCINATION QUESTION.

The paper was illustrated by statistical charts, and was discussed by Dr. J. L. Roseboom.

November 12, 1894.

The President in the chair. Thirty-five persons present.

The Secretary presented the following paper:

GRAPHIC IMAGINARIES.

By Professor Arthur Latham Baker.

There was a time in the history of mathematics when a negative quantity was wholly imaginary. This was when the concept of number had not risen above that of counting material objects. Under these circumstances, of course, a negative object, such as a negative book or the negative inhabitant of a town, was purely imaginary.

Later, when the concept of debit and credit arose, negative numbers became real, to a man deeply in debt disastrously real. Positive numbers represented his credits or resources and if his debts outnumbered these, his profits were appallingly negative.

For half a millennium after this, the $\sqrt{(-1)}$ was also an imaginary number, for the reason that when operating upon arithmetical symbols, we can find no arithmetical symbol which when squared will give the arithmetical symbol -1. The literature of the attempts to extend the concept so that this imaginary symbol should become real is exceedingly voluminous and it is only in comparatively recent times that the attempt has been successful. Argand in the famous Argand diagram first opened the way. That there must be a real interpretation, provided we enlarged sufficiently the concept, was inferable from the persistency with which the symbol obtruded itself into the simplest algebraic operations.

As when we rose from the concept of only material objects to that of debit and credit, the imaginary negative became real, so when we rise from the concept of an arithmetical or algebraic symbol to a more comprehensive one, the imaginary $\sqrt{(-1)}$ in its turn becomes real.

I have provisionally divided symbols, as standing for mathemat-

ical magnitudes, into two classes :—*Pseudographs* or those symbols which have so far as we consider them no physical property in common with the magnitudes they represent, for example, the figures 1, 2, 3, and the letters of the alphabet. A large 2 is no different mathematically from a small 2, nor an italic *2* from a Roman 2. *Ideographs*, those symbols whose physical properties so far as we consider them may be considered as identical or coextensive with the mathematical properties of the magnitudes they represent.

In algebra magnitudes have two properties, size and sense of opposition. Thus, $+a$ and $-a$ have the same sizes but different senses, corresponding to the sense of debit and credit, or up and down, or right and left, that is, they have the sense of opposition.

The ideographs for these would be ———>, <——— which evidently represent two magnitudes of the same size but of opposite senses, that is, of mutual opposition.

Adopting the convention that normal or + magnitudes shall be represented by strokes headed to the right, negative or opposed magnitudes must, of course, be represented by strokes headed to the left.

So far ideographs have no very great advantage over the familiar pseudographs. The question naturally arises, how about the representation of $\sqrt{(-1)}$ by ideographs?

Before we can answer this we must ascertain clearly what is the meaning of the symbol $\sqrt{}$. A moment's reflection will show that it is the symbol of an operation to be performed upon its operand which amounts to finding a mean proportion between the operand and unity, such a result that its successive application twice to unity shall give the original operand. Thus, $\sqrt{}$ applied to a means the finding of such a quantity (multiplier) that applied twice successively to unity it shall give a as a result. Such a quantity is $\sqrt{a}$, for $\sqrt{a}(\sqrt{a} \times 1) = a$; $\sqrt{}(16) = 4$, for $4\ (4.1) = 16$. The test of our result is that a double application of its properties to unity shall produce the original operand.

Before going farther, too, we must ascertain clearly that *multiplication is the doing to the multiplicand what was done to unity to produce the multiplier.*

We are now prepared to ascertain what $\sqrt{(-1)}$ means when applied to ideographs. To make it more clear, let us phrase the symbol $\sqrt{(-1)}$, viz., find such a symbol that the performance upon it of the operation which produced it from unity, shall give the result -1.

In ideographs $+1$ and -1 would be represented by two strokes on the paper mutually opposed, thus, <——— ———>. Here the

plain question is, what can we do to ———> so that a repetition of the operation shall produce <———? The answer stares you in the face, viz., turn ———> to the position ↑, *i. e.*, swing it 90° counter-clockwise. A repetition of the operation swings it to the position <———. Hence, if +1 is represented by ———>, and —1 by <———, then $\sqrt{(-1)}$ is represented by ↑ and the ideograph of $\sqrt{(-1)}$ is a real symbol of the same class as the other symbols and no longer imaginary.

We might have swung ———> clockwise and have found a second symbol ↓ for $\sqrt{(-1)}$. This is in accordance with the algebraic proposition that extraction of square root gives two answers $\sqrt{(-1)} = \pm \sqrt{-1}$. ↑ is adopted as the equivalent of the positive answer and is denoted pseudographically by $+i = +\sqrt{(-1)}$ and ↓ by $-i = -\sqrt{(-1)}$.

Ideographs as here used are merely *strokes* upon the surface of the paper, the performance of the stroke carrying the pen *along the paper* through a certain distance in a given direction.

The addition of two strokes can always be considered as the equivalent of some third single stroke, thus: —> + ———> = ———> or ———> + ↑ = ↗.

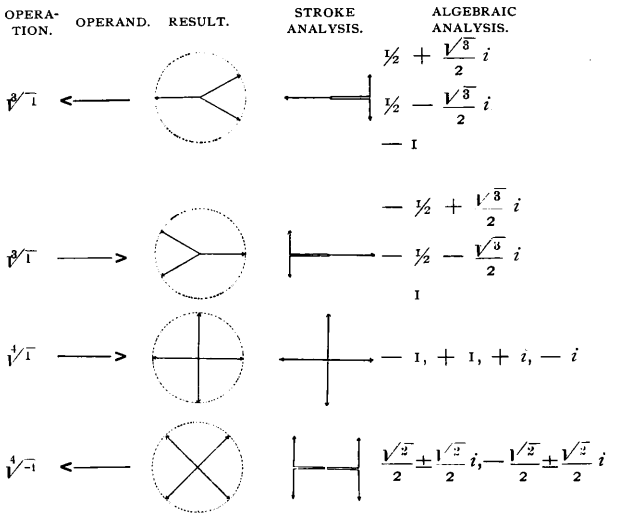
Arranging the pseudographs and ideographs in columns to facilitate comparison we have:

PSEUDOGRAPHS.	IDEOGRAPHS.
$+1$	———>
-1	<———
$\sqrt{(-1)} = i$	↑
$-\sqrt{(-1)} = -i$	↓
$1 + i$	↑ = ↗
$1 - i$	↓ = ↘
$2 + i$	↑ = ↗

Examination of the symbol $\uparrow$ evolves the *rule for the extraction of square root in strokes:—Halve the angle of the stroke and lay off along the bisector the mean proportional between the length of the stroke and unity for the length of the required stroke.*

In the case of roots of unity, this rule for square, cube, etc., roots becomes, *halve, third, quarter, etc., the angle of the stroke and lay off along the trisector, etc., a unit length.*

I give a few simple examples to illustrate the applicability of strokes:



The third column is arrived at by bearing in mind, *e. g.*, that the angle of ———> is either 0°, ±360°, ±720°, etc. A third of these gives 0°, ±120, etc.; a fourth, 0°, ±90°, ±180°, etc.

The last column is arrived at by simple trigonometric or geometric calculation.

Multiplication and division of strokes is performed with similar facility, but I shall not go into these details here. The formal discussion of the subject can be found in any book on the Theory of Functions.

To recapitulate, when the number concept was applied to concrete objects only, a negative number was unintelligible and imaginary, but when the number concept was applied to a more extended object, one where the sense of mutual opposition held, as in the case of debit and credit, the negative lost its unintelligibility and became real. But here the $\sqrt{(-1)}$ was still unintelligible and imaginary, to become in its turn real as soon as the number concept was applied to strokes, where the stroke representing $\sqrt{(-1)}$ is a real stroke though an imaginary number, just as -1 may be a real debt, but a purely imaginary number of inhabitants.

On this system of strokes hangs all the enormous modern development of the Theory of Functions, a development which has increased the volume of mathematical literature more in the last half than in the previous forty centuries, with a corresponding increase of power and extension of grasp.

The paper was discussed by several members.

DECEMBER 10, 1894.

The President in the chair. Forty persons present.

The Council report was adopted, which recommended: (1) The payment of certain bills; (2) The appropriation of a sum not to exceed $50.00 to defray the expenses of the Popular Lecture Course for 1895.

PROFESSOR CHARLES WRIGHT DODGE read a paper

ON PROTOPLASM.

Illustrated by Microscopical Preparations.

JANUARY 14, 1895.

SIXTEENTH ANNUAL MEETING.

Vice-President J. M. DAVISON, in the chair. Forty-five persons present.

The Council recommended the appropriation of $10.00 to pay for lantern illustrations of the paper on the Geology of the Pinnacle Hills. The recommendation was adopted.

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

Secretary's Report.

The report of the Secretary, Professor Arthur Latham Baker, is summarized as follows :

Thirteen meetings have been held during the year, at which have been presented four papers in Botany ; two in Biology ; two in Engineering ; two in Mathematics ; two in Sanitation, and one each in Geology, Geography, Meteorology, Physics, Zoölogy. The informal communications have been six in Botany, four in Engineering, and one each in Astronomy, Biology, Meteorology, Physiology, Zoölogy.

Two memoirs of deceased members have been read.

A license has been granted Mr. E. H. Eaton to collect ornithological specimens.

Corresponding Secretary's Report.

The Corresponding Secretary, Professor Charles Wright Dodge, was unable to present his report at this meeting.

Treasurer's Report.

The report of the Treasurer, Mr. F. W. Warner, was presented at a later meeting, but is here summarized, as follows :

Cash received from former Treasurer, Mr. J. Eugene Whitney	$167 13	
From membership dues	240 00	
		$407 13
Paid Rochester Printing Co., printing of Proceedings	$230 16	
Paid F. A. Steward, map drawing	53 20	
Paid Miss F. Beckwith, writing	50 00	
Paid miscellaneous expenses	68 04	
		$401 40
Balance on hand		$5 73

LIBRARIAN'S REPORT.

MISS FLORENCE BECKWITH, Librarian, read the following report:

Since the last annual report there have been added to the library 800 publications; 19 bound volumes and 781 pamphlets. These are received in exchange for our Proceedings, which are sent to all the leading scientific societies and magazines of the world.

Of the 800 publications received, 313 are from societies and institutions of the United States and 487 from foreign countries. The foreign contributions are as follows:

Canada	48	Austria and Hungary	21
Mexico	23	Norway	6
South America	9	Portugal	19
Central America	5	Sweden	28
Great Britain	27	Belgium	19
Germany	109	Switzerland	13
France	60	Australia	5
Italy	69	Trinidad	5
Russia	20	Japan	1

BOTANICAL CURATOR'S REPORT.

The report of the Curator in Botany, MR. J. B. FULLER, was not read at the meeting, but is here presented, as follows:

During the year 1894, there have been added to the herbarium 437 specimens. The total number of mounted and labeled specimens is now 3,647, representing 1,976 species and varieties, and 511 genera.

REPORT OF BOTANICAL SECTION.

Read by MRS. J. H. MCGUIRE, Recorder of the Section.

During the past year the Botanical Section has held twenty-eight meetings, including the Botanical meeting of the Academy of Science held June 25, 1894, with an average attendance of ten persons; the smallest number present at any meeting being four, the largest fifteen.

The meetings are held fortnightly, at the residence of Mr. William Streeter, No. 14 Scio street, to whose courtesy and generosity we are not only indebted for the free use of a place of meeting, but also of his extensive scientific library, microscopes, and other appliances necessary to the study of Botany.

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

Extracts from the Minutes of the Section.

January 12, 1894. Mr. Fuller exhibited pressed specimens of *Ranunculus fascicularis* Muhl., *R. septentrionalis* Poir, and *R. repens* L., explaining the points of difference between these three species.

An original paper on *Volvox globator* L.,* by Mr. A. M. Dumond, was read. Mr. Streeter illustrated the points made by Mr. Dumond, showing the forms of reproduction, sexual and asexual, with the microscope.

January 26, 1894. Mr. Baxter showed *Hepatica* in bloom. The plant was brought from the woods three weeks before and developed indoors.

Mr. C. C. Laney read an original paper on "Our Native Wild Flowers" and advised their cultivation in gardens. The various stations of the plants mentioned formed the chief topic of the discussion which followed.

Mrs. E. L. Maguire exhibited a collection of pressed plants from Indian Territory and Texas, from which specimens were selected for the herbarium.

February 23, 1894. Mr. Baxter showed a collection of violets, selected from his herbarium, showing the striking variations of plants of the same species, due to a different habitat and environment. These specimens were collected in Holland, Russia, New Siberia Islands, Finland, Peru; also in Ohio, Reading, Pa., New Dorp, Bergen, Adams Basin, and Penfield, N. Y. Specimens of the same species taken from our herbarium were shown and compared.

Miss Westfall, of California, was present and exhibited a portion of her large collection of marine algæ from the Pacific coast.

Mrs. George C. King showed pressed plants from Los Angeles and Lookout Mountain, Cal.

March 9, 1894. Dr. Anna H. Searing exhibited a collection of pressed violets from California, Colorado, the State of Washington, and some of the Southern States.

Mr. Dunbar exhibited a fine *Cypripedium candidum* Muhl., in flower, which was taken from the woods in the fall and wintered indoors.

*See Proceedings, Broch. 4, Vol. II., pp. 293-297.

In microscopical studies, some Pacific algæ were shown by Mr. Streeter.

March 23, 1894. Mrs. King showed specimens of the California pepper plant.

The Pacific algæ studies were continued under direction of Mr. Streeter. He also exhibited a specimen of a Hydroid.

Mr. Walton reported Hepatica in blossom March 16.

April 6, 1894. Dr. Anna H. Searing showed specimens from Virginia Beach, Va., collected by her on a recent visit to that place.

Mr. Streeter presented a fine microscopical exhibit. Among the objects shown were *Fragilaria virescens* Ralfs, *Grammatophora serpentina* Ralfs, *Licmorpha Californica* Grun., *Arachnoidiscus*, *Isthmia nervosa* Kütz, *Tabularia*, *Hyalodiscus*, and statoblast of *Crystatella*.

April 20, 1894. Mr. Dunbar stated that *Erythronium* does not flower until the bulbs are three years old and have reached a depth of eight inches underground. Mr. Walton remarked that his observations agreed with those of Mr. Dunbar.

In microscopical studies *Zygnema*, *Vaucheria*, *Tetraspora*, and *Meridion circulare* (Grev) Ag. were shown.

May 4, 1894. Mr. Walton showed *Mertensia Virginica* DC., having pink blossoms, *Phlox divaricata* L., *Erythronium albidum* Nutt., and several other plants.

May 18, 1894. Mr. Fuller exhibited an example of prolification in a tulip; a perfect single flower borne upon a peduncle, one inch in length, rising from the center of a "double" flower.

Mr. Walton exhibited *Rumex venosus* Pursh., and *Lathyrus ornatus* Nutt., from Colorado.

Mr. Laney showed *Cratægus coccinea* L., having red stripes on the white petals and red stamens. This variation was thought to be caused by an insect.

Mrs. J. H. McGuire showed *Cerastium arvense* L., from Greece, N. Y. Mr. Baxter exhibited *Cardamine pratensis* L., from Penfield.

June 1, 1894. Miss Macauley exhibited *Geranium molle* L. This was the first time it had been reported in Rochester.

Miss Beckwith presented a typical specimen of *Amelanchier Canadensis* Torr. and Gray.

June 15, 1894. Mr. Fuller presented a hybrid willow—a cross between *Salix alba-vitellina* Koch, and *S. lucida* Muhl.

June 23, 1894. The annual excursion of the Section to Bergen swamp was made. Much of the swamp was found to be under water. The flowers, usually so abundant, were scarce, with the exception of *Sarracenia purpurea* L.

July 9, 1894. Mr. Baxter exhibited *Solanum Carolinense* L., and *Arenaria lateriflora* L., both rare.

July 23, 1894. Mr. Baxter showed *Epipactis viridiflora* Reichb., from the bank of the Genesee river. The last edition of Gray's Manual gives Buffalo and Syracuse as the only known stations.

A bouquet of pressed flowers from Crècy-en-Brie, France, sent by Mrs. A. M. Dumond, was received.

August 6, 1894. Mr. Dunbar exhibited *Vincetoxicum nigrum* Moench. Miss Beckwith showed *Specularia perfoliata* A. DC., *Veronica Virginica* L., *Habenaria hyperborea* R. Br., *Hydrastis Canadensis* L., in fruit, *Morus rubra* L., *Pyrus arbutifolia* L. f., *Nymphæa odorata* var. *minor* Sims, and leaves of *Carpinus Caroliniana* Walter, having peculiar variations probably due to arrested development.

August 20, 1894. Mr. Baxter showed *Woodwardia Virginica* Smith, and reported a new station for it at Adams Basin ; also *Polanisia graveolens* Raf.

September 3, 1894. Professor W. H. Lennon, of Brockport, exhibited leaves of *Sassafras* showing variations of form.

Miss Beckwith showed *Mollugo verticillata* L., and *Datura Tatula* L., from Brooklyn Navy Yard.

Mr. Baxter exhibited *Goodyera repens* R. Br., *Drosera intermedia* var. *Americana* DC., *D. rotundifolia* L., *Utricularia intermedia* Hayne, *U. cornuta* Michx., and *U. resupinata* B. D. Greene, from Mendon ponds.

Mr. A. M. Dumond presented the Section with a collection of pressed specimens from France.

Dr. Searing showed a number of plants collected by her on Long Island.

In microscopical studies Mr. Dumond exhibited *Rivularia* attached to *Ceratophyllum*. Mr. Streeter showed *Scenedesmus*.

September 17, 1894. Among the large number of plants exhibited were *Spartina cynosuroides* Willd, by Mr. Baxter, and *Celtis occidentalis* L., by Mr. Dunbar, found by Mr. Laney.

October 19, 1894. Dr. Searing showed a number of grasses from Long Island,

Mrs. King showed *Pycnanthemum linifolium* Pursh., from Canandaigua Lake.

Mrs. E. L. Maguire showed *Monarda citriodora* Cerv., from Texas.

Mr. Streeter exhibited specimens of *Oscillaria* under the microscope.

November 30, 1894. Mr. Baxter showed *Arceuthobium pusillum* Peck, from Mendon.

The following resolutions were presented by Mr. J. Y. McClintock and were adopted :

WHEREAS : It is necessary to have an accurate Topographical Map of the State of New York in order to develop its wonderful natural resources and to study the possibilities of improving its hundreds of water powers, to drain swamps, protect valuable lands from injury by floods, protect the water supplies of cities, improve roads, preserve and create forests, provide water supply to canals, study the geology and natural history, locate mines and quarries, investigate the agricultural possibilities, etc., and

WHEREAS : Such a survey and maps have been partially completed at the joint expense of the State of New York and the United States Government, at the least possible cost to the State,

Resolved : That the Rochester Academy of Science earnestly requests the Legislature to make the necessary appropriations to complete the survey of the State in the shortest time; and

Resolved : That this Academy urges that the original sheets of the survey of that part of the Genesee Valley not yet completed be made upon a scale of not less than one in twenty thousand, because while the cost will not be greatly increased the value of the survey will be far greater and will be more valuable for the purposes required, and

Resolved : That copies of these resolutions be forwarded to the Senator and Assemblyman from this district and to the State Engineer and Surveyor.

ELECTION OF OFFICERS.

The annual election of officers for the ensuing year was held and resulted as follows :

For President, HERMAN L. FAIRCHILD.
For First Vice-President, J. M. DAVISON.
For Second Vice-President, J. EUGENE WHITNEY.
For Secretary, ARTHUR LATHAM BAKER.
For Corresponding Secretary, CHARLES WRIGHT DODGE.
For Treasurer, F. W. WARNER.
For Librarian, MISS FLORENCE BECKWITH.
For Councillors, C. C. LANEY, *till 1898*,
DR. G. W. GOLER, *till 1898*.

The President had been announced to present a paper upon The Geology of the Pinnacle Hills, but was absent on account of illness.

The Secretary presented an informal paper upon the subject of

DIRECTED MAGNITUDES.

FUNDAMENTAL OPERATIONS IN MATHEMATICS.

BY PROFESSOR ARTHUR LATHAM BAKER.

Empty space may be considered as a continuum of *positions*. A number of neighboring positions taken together we will consider as locating a point in space and will designate as a *point*, and the number of positions composing it, its *weight*.

The characteristics of points are *weight* and *location*.

I.

Considering for the present only the weights, *what operations can be performed?* Obviously we can combine the weights, either in their normal condition (addition), or we can reverse the operation (subtraction), or we can consider the weight of one point as the symbol of an operation to be performed on the weight of the other. The weight has only one characteristic : the manner in which it differs from unity. As a symbol of operation, this manner of difference is either its evolution from unity, or its conversion into unity.

If we take the first manner of difference as the process which is to be repeated, we call it multiplication, or the doing to the operand whatever was done to unity to produce the operator.

If we take the second manner of difference as the process which is to be repeated, we call it division, or the doing to the operand whatever was done to the operator to produce unity.

II.

Hitherto we have considered the various positions composing a point as merely bunched together, but if we consider these positions as arranged in a certain order or sense, then a point has in addition to its weight the characteristic of normalcy or opposition of the weight. The *normal sense* or direction of arrangement we designate by $+$, the *reverse sense* or direction by $-$.

In addition to the normal and reversed senses of the weight, we have also the *mean reversed* sense indicated by $\sqrt{-}$ (see Algebraic Symbols, Am. Jour. Math., xviii., 62).

The weights, having merely magnitude (with sense) are *scalars*, that is, magnitudes whose properties can be scaled off on a scale.

Out of the weights of the points, then, we get six fundamental operations: addition, subtraction, multiplication, division, reversion and mean reversion—*and no others*.

III.

Applying these six operations to scalars, the only magnitude so far, we get the following results:

The sum of two scalars is a scalar;

The difference of two scalars is a scalar;

The product of two scalars is a scalar;

The quotient of two scalars is a scalar;

The reversion of a scalar is a scalar;

The mean reversion of a scalar is a *vector* (loc. cit.), a quantity having magnitude and direction.

Applying the six algebraic operations to this new quantity, the vector, we get:

The sum of two vectors is a vector;

The difference of two vectors is a vector;

The product of two vectors is a *quaternion* (a scalar plus a vector, a scalar, or a vector, according to the position of the mean reversing operator or symbol) (loc. cit.);

The quotient of two vectors is a quaternion;

The reversion of a vector is a vector;

The mean reversion of a vector is a quaternion.

Applying the six operations to this new quantity, the quaternion, we get :

The sum of two quaternions is a quaternion ;
The difference of two quaternions is a quaternion ;
The product of two quaternions is a quaternion ;
The quotient of two quaternions is a quaternion ;
The reversion of quaternion is a quaternion ;
The mean reversion of a quaternion is a quaternion ;

} Including the limiting cases, the scalar and the vector.

Out of the weights of the points, then, we get *two fundamental* quantities : scalars, vectors (and their combination, quaternions) and *no others*. The introduction of such terms as versors, turning factors, quadrantal versors, etc., etc., is merely cumulative, and unnecessary except as a convenient mode of designating some particular phase of the two fundamental quantities, the scalar and the vector. As we have seen, a quaternion is either the product of two vectors, or the sum of a scalar and a vector, and as a *symbol of operation* designates the conversion of one vector into another. This avoids such artificial and mystifying definitions of a quaternion as, a quasi mechanical operator . . . . composed of a magnitude and a turning factor, etc.

A vector, considered as a symbol of operation, is a mean reverser. This is the inevitable result of our definition of multiplication (loc. cit.). When the vector occurs in combination with a scalar (the quaternion) it does not necessarily need a new name (turning factor, etc.). It simplifies not only the theory but also the use of quaternions to consider them as simply a combination of a scalar and a vector, to be operated with and upon by the rules applicable to scalars and vectors. This method of looking at scalars and vectors (quaternions) binds the whole subject of Reals, Imaginaries and Quaternions into a united and homogeneous whole, the quaternion being the inevitable logical expansion of the elementary algebraic conceptions. It avoids all assumptions as to "the definition of the multiplication of i into j", all arbitrary retention or rejection "of the old laws of multiplication", all introduction of arbitrary "laws", all attaching to multiplication of "any signification we please when we speak of vectors", etc.

IV.

The weights of the points have by their characteristic of difference from unity (their only characteristic) indicated the operation of multiplication, and its inverse, and nothing else.

Making use of the space concepts of symmetry and completeness and carrying out this operation of multiplication in utmost symmetry and completeness, we have as the only possible definite result, $(1 + \frac{1}{\infty})^{\infty} = 2.718.... = e$, one of the pair of numerical values so obtrusive in all nature.

If we bunch the positions which constitute the point and distribute the points into the most symmetrical shape, the number of positions or the weight will be $k\pi$, a multiple of the other numerical value so omnipresent in the universe, $\pi = 3.141592...$

As might be expected from this investigation, no other numerical operations being indicated, there are no other numerical values comparable with e and π.

V.

A *vector* is a quantity having size, sense and *direction of extension*, but not location of extension, such as impulse, velocity, distance toward α Centauri, etc.

A *geometrical quantity* or *posited vector* is a magnitude having size, sense, direction and location of extension, such as velocity along a given path, etc. *Size* of *extension* is the size in the ordinary acceptation of the term. *Direction* or *quality of extension* is that property of extension which prevents the quantities from coinciding when brought together. Parallel lines have the same quality of extension. Solids have no distinctive extension and are, therefore, scalars. Geometrical quantities have the same *location of extension* when the qualities are not only the same but coincident: the extension of the one is the continuation of the extension of the other.

Geometrical quantities are *equal* when their properties are the same, viz., magnitude of extension, direction of extension and location of extension.

VI.

We now consider the location of points, as well as their weights, first taking the case of unit points. In this case it is almost axiomatic that the sum of two unit points will be the point midway between them (called the *mean point*) with a weight of two, since this is the only result that combines the properties of the components, taking into consideration both weights and locations, and which gives each the same potency in determining the result.

An extension of this thought will show that in the case of points with unequal weights the mean point must be in line with the com-

ponents and at a distance inversely proportional to the weights of the components, with its weight the sum of the weights of the components. Accordingly if p_1, p_2, m_1, m_2 designate the points and weights

$$m_1 p_1 + m_2 p_2 = (m_1 + m_2)\bar{p},$$

where $\bar{p}$ designates the mean point.

This can be written $m_2 (p_2 - \bar{p}) = m_1 (\bar{p} - p_1)$.

The factors $(p_2 - \bar{p})$, $(\bar{p} - p_1)$ are inversely proportional to the weights of the components and, therefore, proportional to the distances of the mean point from the components, and, therefore, with the proper unit of measure, equal to these distances.

In $p_1 + mp_2 = (1 + m)\bar{p}$, as m decreases, the mean point $\bar{p}$ approaches p_1, coinciding with it for $m = 0$, and finally passes beyond it to ∞ as m approaches -1, and the equation becomes

$$p_1 - p_2 = 0\bar{p}$$

that is, the difference of two unit points is a point of zero weight at ∞. The meaning of a zero point at ∞ can be ascertained by considering its effect.

If $p\infty$ denote a point at ∞

$$mp_1 + p\infty$$

is a mean point of weight $(m + 1)$ lying in a determinate direction. As m increases, the mean point approaches p_1, coinciding with it at the limit $m = \infty$, or dividing by $m = \infty$, $p_1 + 0p\infty$ is a mean point coincident at the limit with p_1, but in a determinate direction of approach, or, in other words, $0p\infty$ has merely the effect of assigning direction, that is, it is a vector, and, therefore, $p_1 - p_2 = 0p\infty$ is a vector. The length of the vector $p_1 - p_2$ is found from the equation $m_2 (p_2 - \bar{p}) = m_1 (\bar{p} - p_1)$ to be equal to the distance between the points, measured naturally from the subtrahend to the minuend. We might have supposed *a priori* that the only difference between two unit points would be difference of location, a vector, that which is necessary to convert one point into the other.

If $p_1 - p_2 = p_3 - p_4 = \ldots = 0p\infty$, these vectors cannot be posited; their equality must be of magnitude and direction only—excepting the limiting case of collinearity.

VII.

Considered as a symbol of operation, what is the potency of p_2 on p_1?

The only difference between p_2 and p_1 is one of location, and the only way we can impress this difference of location on p_1 is to carry it

o the location of p_2. But this amounts to a transference, a vector. As this operation results in the formation of a new quantity, the vector between the two points, the operation is called *combinatory multiplication* to distinguish it from algebraic multiplication of weights. This gives us the definition :—*A combinatory or geometrical product of two quantities not having an element of their extension in common, is the geometrical quantity produced by the guided factor as it moves over the path determined by the guiding factor.*

The guided factor is written first. Thus, $p_1 p_2$ is the posited vector whose magnitude, direction and location of extension are determined by the movement of p_1 to p_2. Movement in the opposite direction would, of course, have a different sign, or $p_1 p_2 = -p_2 p_1$, giving us the *alternative law of multiplication.* Evidently $p_1 p_1 = 0$, or *the product of two identical factors is zero.*

Since the only properties of a vector are magnitude and direction, its guiding influence on a point must be to make it move a distance and direction determined by the vector, and $p_1 \varepsilon$ (ε denoting a vector) becomes a vector through a fixed point. Hence :—*Guiding a point by a vector converts the point into a posited or point vector, or locates the vector.*

Guiding a vector by the location of a point locates the vector through the point. Guiding the magnitude of extension of the vector by the zero magnitude of the point must be just the opposite of guiding the zero magnitude of the point by the magnitude of the vector and hence must reverse the vector. Or, *guiding a vector by a point locates the vector and reverses its direction.* Thus, $p_1 \varepsilon = -\varepsilon p_1$.

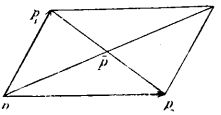
Similarly the *product of two vectors* is the plane area generated by the movement of the first vector as it is guided by the characteristics (magnitude and direction) of the second vector. As the angle between the two vectors passes through π the area passes through zero. Hence :—*The sense of the area is + or — according as the guided vector is guided by a vector on its left or right, or vice versa.* Thus, $\varepsilon_1 \varepsilon_2 = -\varepsilon_2 \varepsilon_1$.

Guiding a point by the characteristics of a point vector (posited vector), magnitude, direction and location of extension, must result in a posited plane area double that of the triangle determined by the point and the posited vector. Denoting the posited vector by $p_2 p_3$, we have for the resulting area $p_1 p_2 p_3$. Arranging the products of the three points in all possible ways, we find that the only way to separate

the equal areas into two sets is by the adoption of the *cyclical* and *associative laws*, viz.,

$$p_1p_2p_3 = p_3p_1p_2 = p_1 \cdot p_2p_3 = p_1p_2 \cdot p_3 = \ldots = -p_2p_1p_3 = \ldots$$

From the analogy of vectors to velocities it is evident that—*The sum of two coplanar posited vectors is a vector passing through the common point of their extensions and equal in length and direction to the resultant of the two vectors considered as velocities;* that is



$$p_0p_1 + p_0p_2 = 2p_0\bar{p}$$
$$= 2p_0\frac{p_1+p_2}{2} = p_0(p_1+p_2)$$

Hence we have the *distributive law for the multiplication of three points.* By reversing the direction of one of the vectors we get :—*The difference of two co-initial posited vectors is a vector through the common point of their extensions and equal in length and direction to the vector connecting their ends.*

For parallel vectors, the same modifications of these rules hold as in the case of impulses, and the difference of two equal parallel posited vectors becomes

$$L_1 - L_2 = p_1\varepsilon - p_2\varepsilon = (p_1 - p_2)\varepsilon = 0p\infty\varepsilon = \text{a zero vector at } \infty.$$

As in the case of the zero point at ∞, we find that the zero vector at ∞ becomes a mere plane direction, a plane vector.

VIII.

Guiding a posited vector by the characteristics of a posited vector, magnitude, direction and location of extension, gives a parallelopiped with the given vectors as edges.

In plane space, since the posited vectors must have an element of their extensions in common, viz., a point, we can write $L_1 = p_0p_1$, $L_2 = p_0p_2$. Of the products possible (all equal plane areas) by different arrangements and associations, the two p_0's not being allowed to come together in the same set, we find that the only possible basis of division into two sets is the rule :—*Looking from (or along) the guided factor, if the points of the guiding (or guided) factor run in cyclical order, or forward with the operand on the right, the product is unchanged, and vice versa.*

Thus, $p_0p_1 \cdot p_0p_2 = p_0 \cdot p_0p_1p_2 = -p_0 \cdot p_0p_2p_1 = -p_0p_2 \cdot p_0p_1$

or, $$L_1 L_2 = -L_2 L_1$$

that is :—*The product of two coplanar posited vectors is not commutative.*

This product introduces a new result. Out of the product of the two posited vectors, each having magnitude, direction and location of extension, we get, as shown above, a point p_0, the common element of the posited vectors, and a scalar area $p_0p_1p_2$, that is, the two factors have produced a quantity of a lower order than either of the factors. This is called a *regressive product.*

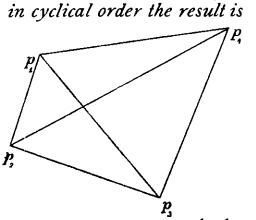
We might have expected this, for out of the combination of the two posited vectors, the common element of extension, the point in this case, is the only quantity that has any distinctive geometric characteristic, the area generated being a mere scalar, differing from all other areas in magnitude only, and the product of the two posited vectors is a weighted point.

The same considerations apply to the product of a posited vector and a posited area, etc., thus suggesting the rule :—*The product of two posited quantities which have a common element of extension is that element multiplied by some scalar.*

Guiding a vector by two others in succession gives the parallelopiped having the vectors for its edges. The product of four points is in a similar manner the parallelopiped six times the connecting tetrahedron. Arranging the products of the four points in the possible different ways, taking into account the association into single, double and triple factors, we find that the only basis of division into two classes is the rule :—*Looking from (or along) the operator if the points of the operator (or operand) run in cyclical order the result is unchanged.*

Hence,

$$\begin{aligned} p_1p_2p_3p_4 &= p_1p_2p_3 \cdot p_4 = Pp_4 \\ &= p_1p_2 \cdot p_3p_4 = L_1 L_3 \\ &= p_3p_4 \cdot p_1p_2 = L_3 L_1 \\ &= -p_4 \cdot p_1p_2p_3 = -p_4 \cdot P \end{aligned}$$



$p_4 \cdot p_1p_2p_3$ is negative because viewed from p_4, $p_1p_2p_3$ runs clockwise, whereas when p_4 is viewed from $p_1p_2p_3$, $p_1p_2p_3$ runs counter clockwise. Hence :—*The product of a point and a posited plane vector (P) is not commutative; the product of two diplanar posited vectors is commutative.*

In the planar product of a point and two posited vectors, we get, as might be expected, a *mixed product*, regressive from the product of the two posited vectors, and combinatory from the result of the point into the regressive point, viz.:

$$p\,L_1\,L_2 = p\cdot p_0p_1\cdot p_0p_2 = p\cdot p_0\cdot p_0p_1p_2 = pp_0\cdot p_0p_1p_2$$

= a posited vector with a weight $p_0p_1p_2$.

The product of three coplanar posited vectors:

$$\begin{aligned} L_1\,L_2\,L_3 = L_1\cdot L_2\,L_3 &= L_1\cdot p_1\cdot mp_1p_2p_3 \\ &= L_1p_1\cdot mp_1p_2p_3 \\ &= \beta p_1p_2p_3\cdot mp_1p_2p_3 = m\beta\,(p_1p_2p_3)^2 \end{aligned}$$

m, β, being scalars, and p_1, p_2, p_3 the points of intersection of the posited vectors.

IX.

Two points are independent of each other, that is, one cannot be expressed in terms of the other, whereas of three collinear points, any one can always by a proper adjustment of weights be considered as the mean point of the other two, that is, is pendable on them, to coin a word for the moment.

Of three points at random, no one can be made the mean of the other two, and, therefore, *three points are independent.* If a fourth point be introduced into the plane of the three, it can by a proper adjustment of weights be made a mean of the other three, and, therefore, *four or more co-planar points are pendable.* Similarly *four points in space are independent; five or more points in space are not independent.* Two non parallel vectors are independent; two parallel vectors are not independent. Three vectors not parallel to a plane are independent, but not independent when parallel to a plane. Four or more vectors are not independent. We have found the product of two points to be the posited vector between them. If we attempt to multiply by a new point collinear with these, the combinatory product is nil. Similarly with three vectors in a plane, and so on. This suggests that the *product of pendable factors is nil*, which will be found to hold for four coplanar points, three coplanar vectors, etc., unless the product of previous factors (counting from the right as written) becomes regressive or scalar. For example, in the product of the three coplanar posited vectors $L_1\,L_2\,L_3$ of section VIII.

Hence the laws of section VII. should have been restricted to independent factors.

JANUARY 21, 1895.

SPECIAL MEETING.

Held in the hall of the Chamber of Commerce, the President in the chair. Seventy-five persons present.

The meeting was called for the purpose of presenting the following paper :

THE NEW CONDUIT OF THE ROCHESTER WATER WORKS.

BY MR. EMIL KUICHLING.

The paper was illustrated by a large number of lantern views.*

[Following the adjournment of the Society a conference was held of members and others interested in Engineering Science for the purpose of organizing a Section of Engineering.

The report of this and other meetings of the Section will be found in the Section Report made at the annual meeting, January 14th, 1896.]

JANUARY 28, 1895.

The President in the chair. Forty persons present.

The following communication was read :

ROCHESTER, Jan. 28, 1895.

PROFESSOR H. L. FAIRCHILD,
President Rochester Academy of Science.

DEAR SIR :—

I beg leave to report that on Monday, January 21st, the gentlemen whose names are given below met at the Chamber of Commerce and organized as the Engineering Section of the Rochester Academy of Science by electing MR. EMIL KUICHLING permanent Chairman and J. Y. MCCLINTOCK Recorder.

Very respectfully yours,

J. Y. McCLINTOCK.

*The substance of the paper is printed in Mr. Kuichling's report as Chief Engineer of the Rochester Water Works, January 1, 1896, in the 19th and 20th Annual Reports of the Executive Board ; also in the "Engineering Record," April 13 to May 25, 1895, inclusive, and an abstract in "Engineering News" of April 11, 1895. The articles in the two journals contain numerous illustrations of plans and details of the work.

Upon motion of MR. MCCLINTOCK the Society formally ratified the organization of the Engineering Section.

On motion of MR. EMIL KUICHLING the rules relating to the election of members were unanimously suspended and the following named persons who would join the Engineering Section were nominated and formally elected active members of the Society :

W. M. ALBAUGH,	C. N. MUNGER,
HOUSTON BARNARD,	CLARENCE R. NEHER,
JOHN BISGOOD,	H. T. POWELL,
F. A. BROTSCH,	JACOB M. C. QUARLE DE QUARLES,
LEGRAND BROWN,	CHARLES L. RAYMOND,
ROBERT CARTWRIGHT,	STUART ELY SILL,
GATES A. CLARK,	JOHN F. SKINNER,
EDWIN A. FISHER,	WILLIAM J. STEWART,
FRED FORCE GORDON,	WILLIAM R. STOREY,
WILLIAM C. GRAY,	GAYLORD THOMPSON,
HORATIO JONES,	GEORGE S. TIBBITS,
WILLIAM F. JORDAN,	FRANK H. CLEMENT,
ALFRED C. LEWERENZ,	FRANK W. BRISTOW,
WILLIAM S. MCMILLAN,	JOHN A. DAVIS.

The following preamble and resolutions were presented by MR. J. Y. MCCLINTOCK :

" WHEREAS, A joint Legislative Committee appointed to con-
" sider which of the present State Commissions could be properly
" dispensed with has reported in favor of abolishing the State
" Weather Bureau, and

" WHEREAS, Such Bureau has been of great value to the State
" during the years of its existence, and

" WHEREAS, It having been of little expense to the State, most
" of the work being performed by voluntary observers, it is believed
" that the report of the Joint Committee must be based upon a mis-
" conception as to the work of this Bureau, and its value to the
" State, therefore,

" *Resolved*, That the Secretary of the Rochester Academy of
" Science be hereby directed to send a copy of this resolution to the
" Senator and Members of Assembly from this County, requesting

" them to use all honorable means to prevent the abolishing of this " Bureau on the ground that its work has not only been of great " value in the past, but by continuing its work the records which it " makes will acquire more value to science from year to year."

In the discussion upon these resolutions MR. GEORGE W. RAFTER spoke as follows :

This Bureau was created by, and organized under Chapter 148, Laws of 1889, and re-organized and placed under the department of Agriculture by Chapter 338, Laws of 1893. Up to 1893, $4,500 was appropriated annually for the maintenance of the Bureau, but it was not until 1893 that as much as this amount was spent in any one year. The annual report for that year shows an unexpended balance of $3919.66. There are now about ninety voluntary observers, who each month furnish the service with meteorological observations.

For three years MR. E. T. TURNER gave his entire time to the work of this Bureau without compensation. At present he receives $100 per month.

Aside from the cost of printing and the purely clerical work of preparing the monthly bulletins and the cost of instruments, the service has been conducted without expense to the State. The distribution of the monthly bulletins and reports is effected through the Post Office without cost to the State, under a franking privilege extended by the United States Government. A proposition to abolish the Department is therefore, in effect, a proposition to prevent a large number of earnest people from doing important scientific work gratuitously.

The resolutions were unanimously adopted.

The first lecture of the Popular Lecture Course for the season of 1895 was then given by Mr. J. D. MALLONEE, of Buffalo, entitled :

THE STRUCTURE OF ROCKS AS SHOWN BY POLARIZED LIGHT.

The lecture was illustrated by projections of rock sections upon the screen. A vote of thanks was tendered the lecturer.

FEBRUARY 11, 1895.

The President in the chair. Seventy-five persons present.

The following candidates were nominated and under suspension of the rules were elected active members or the Society:

FRANK L. DODGSON, J. L. LITTLE, FRED H. CRAFTS, GEORGE A. HOTCHKIN.

The Treasurer made a verbal report intended for the annual meeting. (See page 156.)

The Council report recommended the payment of certain bills, which were ordered paid.

In the absence of MR. J. STANLEY-BROWN, who had been announced to deliver the second Popular Lecture, the President, PROFESSOR H. L. FAIRCHILD, exhibited a series of lantern slides illustrating certain features in the local geology.

FEBRUARY 14, 1895.

SPECIAL MEETING.

The President in the chair. A large audience present.

The second lecture of the Popular Lecture Course, which had been deferred from February 11, was given by MR. JOSEPH STANLEY-BROWN, of Washington, entitled:

THE PRIBILOF ISLANDS AND THE SEAL INDUSTRY.

The lecture was illustrated by a large number of lantern views. The lecturer was tendered a vote of thanks.

FEBRUARY 25, 1895.

The President in the chair. Twenty-five persons present.

The following paper was presented:

THE DESPOTISM OF THE PLURALITY.

By Mr. J. Eugene Whitney.

The paper was illustrated by statistical charts and by practical illustration of the Swiss method of conducting elections. The paper was discussed by several members and visitors.

[Following adjournment the subject of organizing a Section of Social and Economic Science was discussed. Signatures were obtained to a request for such a Section, and the matter was left in the hands of a Special Committee, consisting of Mr. F. W. Warner, Temporary Chairman, Mr. W. R. Storey, Temporary Secretary, and Mr. J. Eugene Whitney.]

March 11, 1895.

The President in the chair. Thirty persons present.

The following named persons were proposed for membership and under suspension of the Rules were unanimously elected, by formal ballot: John W. Kenyon, J. Watson Sims, O. H. Strowger.

The following paper was then read:

THE TEETH OF MAN.

By Mr. Charles H. Ward.

The paper was illustrated by a series of dentological preparations and material in comparative dentology; and by a large number of human skulls illustrating normal and abnormal growth of the teeth.

March 25, 1895.

The President in the chair. A large audience present.

The third lecture in the Popular Lecture Course was given by Professor W. W. Rowlee, of Cornell University, entitled:

THE EVOLUTION OF SEEDS.

The lecture was illustrated by a series of lantern views. A vote of thanks was tendered the lecturer.

APRIL 8, 1895.

The President in the chair. Twenty-five persons present.

The Council report recommended the payment of certain bills, and that PROFESSOR W. W. ROWLEE, of Cornell University, be elected a Corresponding Member.

PROFESSOR ROWLEE was elected and the bills ordered paid.

The following paper was then presented:

DIPHTHERIA AND ANTI-TOXINE.

BY PROFESSOR CHARLES WRIGHT DODGE.

The paper was illustrated by apparatus, cultures and microscopic preparations.

APRIL 22, 1895.

The President in the chair. A large audience present.

The fourth lecture of the Popular Lecture Course, upon the Panama Canal, by MR. ADELBERT CRONISE, which had been announced for this evening, was not given on account of the lecturer being in the Hawaiian Islands. As a substitute the President of the Academy presented the paper which he had been unable to read at the Annual Meeting, entitled:

THE GEOLOGY OF THE PINNACLE HILLS.

BY PROFESSOR HERMAN LEROY FAIRCHILD.

[ABSTRACT.] *

This range of hills, lying along the southern edge of the city of Rochester and extending from Brighton to the Genesee river, is of peculiar geologic interest, and the location and trend with complex

*The substance of this paper, with a map, is published in the American Geologist, Vol. XVI, pages 39-51, July, 1895.

structure and composition made the hills a puzzle to earlier students. In 1892 the hills were observed by Mr. Warren Upham, who published in 1893 in these Proceedings* a paper describing them as an Esker, or gravel ridge, laid down in the ice-walled channel of a glacial river. After detailed study of the deposits the present writer finds an explanation of their genesis radically different from that of Mr. Upham.

The Pinnacle hills were not accumulated in the bed of an overloaded stream, flowing toward the ice front, but were piled along the edge of the glacier. They are part of a frontal moraine and consist of the debris washed out of the ice sheet by the drainage, along with considerable unmodified drift deposited directly by the ice. The hills are essentially morainal, but being chiefly waterlaid drift, sand and gravel, are technically called Kame and may properly be termed Kame-moraine. The various reasons for this interpretation of their origin are briefly epitomized as follows :

The hills are not a ridge but a belt of knolls; the range having a curvilinear trend, with the convexity southward. The general direction of the chord of the arc is W. 15° S. The morainal deposit is continued westward from the Genesee river as a low but distinct moraine as far as Albion, which was first traced by Mr. Frank Leverett. Other morainal phenomena occur eastward and beyond the Irondequoit gulf. The topography of the range is emphatically morainal, knob and basin, or mound and kettle. The striæ upon the underlying rock, Niagara limestone, are in two sets, the older having a direction S. 40°–60° W. and the later nearly at right angles to the curving moraine. The northward face of the range is very steep and irregular, the deposit upon that side having been banked against the ice and left at the angle of repose by the removal of the ice support. The southern slope is usually gentle and uniform. This difference is seen clearly by looking eastward to Cobb's hill from the "Pinnacle." The presence of much till in the range, especially upon the north slope and summits, is significant. Heavy boulders occur upon the very crest of the "Pinnacle," and the southern ridge of Cobb's hill is a mass of remarkably heavy boulder till. The disturbed, crumpled and crushed condition of the beds along the north slope indicates a pushing or overriding by readvance of the ice front. The beds along the north side dip steeply southward into the range, and

*Vol. 2, pages 181-200, February, 1893.

while there is considerable variation, with as much eastward as westward dip, the general direction of inclination is southward or across the range.

During the time of the deposition of these hills, vast glacial waters were held south of the ice sheet in this region, having at first their outlet westward to the Mississippi but with final escape eastward to the Mohawk. The Pinnacle hills were accumulated in these waters as shown by the following characters :

The deposits throughout the range are mainly waterlaid drift, coarser upon the north side and grading into fine sand upon the south side and into clay upon the plain beyond. These finer deposits upon the southern flank of the range are quite horizontal and undisturbed and must have been deposited in standing water. Large boulders occur in the fine deposit, which signify flotation by ice.

These hills rise only 100 to 200 feet above the Rochester plain, and are conspicuous because of their isolation. They are however the only heights within several miles of the city, and an appeal is made for their preservation, since they are being destroyed for building materials. Their practical use for reservoir sites, etc., is exceeded by their æsthetic value. As part of the park system and the people's pleasuring ground they would be of inestimable value to the inhabitants of the future city, and the city officials and people of this day will receive and merit the condemnation of posterity if measures are not taken to preserve the hills from destruction.

The lecture was illustrated by maps and lantern views.

In the discussion of the paper remarks were made by H. C. Maine, A. C. Allen and Emil Kuichling urging the importance of preserving the "Pinnacle Hills." The following resolutions offered by Professor S. A. Lattimore were unanimously adopted :

WHEREAS, The range of hills on the southern border of the city of Rochester, popularly known as the Pinnacle hills, constitute a natural feature of our landscape, remarkable alike for the pleasing diversity which their outline, rising boldly from the plain, gives to the environment of our city, and also for their wonderful geological formation, being, in fact, the unique relics and monuments of a period antedating by cycles the pyramids of Egypt and all other human structures, whose strange and instructive history is recorded in their strata of sand and gravel, and of which the paper of Professor Fairchild constitutes so valuable an elucidation, and

WHEREAS, These are the only hills within a radius of several miles of the city of Rochester, from whose heights the whole plain of the city, the beautiful region toward the north, and even the blue horizon of Lake Ontario are in full view, and so are of inestimable value for both scientific and æsthetic considerations, and

WHEREAS, The unrestrained cutting away of these hills for the purpose of obtaining building materials is rapidly defacing and destroying them, and already threatens the highest point, called the Pinnacle; therefore

Resolved, That it is the sentiment of this Society that public opinion should be aroused to the value of these hills to the city of Rochester, and to the danger that threatens their existence; and,

Resolved, That in the opinion of the members of this Society, the Pinnacle Hills throughout their whole extent should become a part of the system of public parks of Rochester, which in connection with the Genesee river, its cataracts and the canyon, would thus include a matchless combination of natural scenery ; and further be it

Resolved, That to secure immediate attention to this subject these resolutions be transmitted to the Common Council, the Board of Park Commissioners, to the Chamber of Commerce and to the Historical Society.

MAY 13, 1895.

The President in the chair. Twenty-five persons present. The Council report was adopted which recommended (1) The payment of a bill for janitorial services. (2) The election of the following persons as active members of the Society, under suspension of the rules :

PROFESSOR HENRY E. LAWRENCE,
MRS. AUGUSTA B. GOULD,
MISS EMMA E. ILES,
MR. CHARLES H. POTTER.

The following paper was read :

THE COLEOPTEROUS FAUNA OF ROCHESTER AND VICINITY.

BY RICHARD M. MOORE, M. D.

The paper was illustrated by charts, diagrams and specimens.

MAY 27, 1895.

Vice-President J. M. DAVISON in the chair. Sixty persons present.

MR. H. K. PHINNEY exhibited fragments of charred wood found beneath four and one-half feet of drift in a sewer excavation in Dartmouth street.

The fifth and last lecture of the Popular Lecture Course, illustrated by charts and lantern views, was delivered by the President, as follows :

GLACIAL LAKES OF WESTERN NEW YORK.

BY PROFESSOR HERMAN LEROY FAIRCHILD.

[ABSTRACT.]*

This paper was a description of the waters held at high level in the north and south valleys between the receding front of the great ice sheet and the north-sloping land surface. The plateau of central and southwestern New York is deeply trenched by ancient stream erosion, some of these valleys now holding the so-called "Finger" lakes. Each of the trenches, whether now impounding water or not, was, during the ice retreat, the site of a lake having as its northern barrier the ice front and with its outlet southward across the divide into southern drainage. The height of these ancient glacial lakes was that of the lowest col or pass at the head of the valley, usually some hundreds of feet above the present valley bottom. The channel cut by the draining stream appears on the southern side of each col and at corresponding heights along the valley slopes are found the deltas built in the lakes by the inflowing streams.

To distinguish the ancient ice-dammed lakes from the existing lakes in the same valleys the former are named after the chief towns in the basins, or by prefixing the term "glacial." For example, the glacial water in the head of the Seneca valley is called Watkins lake, and it had its outlet through the site of Horseheads to the Chemung river, with an altitude of 900 feet, or toward 500 feet above the present Seneca lake. The ancient lake in the Canandaigua valley is Naples lake ; in Keuka valley, Hammondsport lake ; in Cayuga valley, Ithaca lake ; in Skaneateles valley, glacial Skaneateles lake.

*The substance of this address is published in the Bulletin of the Geological Society of America, Vol. 6, pages 353-374, April, 1895, with six plates.

The paper described a series of these lakes in the several valleys, extending in a belt from the Tonawanda valley on the west to the valleys in the region of Syracuse on the east, with their phenomena and life history. These lakes expanded northward with the ice recession and were destroyed by the opening of outlets across the east or west borders lower than the original southward outlet. Those lakes with higher levels were lowered to adjoining lakes of lower levels, and all were eventually drained into and blended with the great glacial Lake Warren, which poured its waters westward to Mississippi drainage, and crept eastward along the ice front until it was also destroyed by draining east into the Mohawk.

During the life of the local lakes, Ithaca lake on the east and Hammondsport lake on the west were lowered to the level of the Watkins lake, which in its expanded state is called Lake Newberry. The latter met its extinction by draining westward into Lake Warren at a point five miles southeast of Canandaigua village, soon blending with the larger water.

JUNE 10, 1895.

The President in the chair. Fifty persons present. The Council report was adopted which recommended the payment of certain bills.

Under suspension of the rules JOHN J. HEVERON and A. E. DUMBLE were nominated and elected active members.

MR. ADELBERT CRONISE gave a lecture illustrated by lantern views entitled :

A MONTH IN THE HAWAIIAN ISLANDS.*

JUNE 24, 1895.

The President in the chair. Seventy-five persons present.

The President announced that this meeting, according to the usual custom, would be held under the direction of the Botanical Section; and the Vice-Chairman of the Section, Miss Florence Beckwith, assumed the chair.

*This address is published with illustrations in the Commercial Travelers' Home Magazine, Vol. VI, pp. 1-18, January, 1896.

Miss Beckwith spoke of the different exhibits, calling particular attention to some of the more rare and interesting species of native plants in the large collection.

PRESIDENT FAIRCHILD read for the author the following paper :

A MEMORIAL SKETCH OF CHESTER DEWEY, M.D., D.D.

BY CHARLES W. SEELYE.

The subject of this notice was born at Sheffield, Massachusetts, in 1784. In 1806 he graduated at Williams College and then studied for the ministry, and was licensed to preach in 1808. The same year he accepted a tutorship in Williams College and in 1810 was appointed Professor of Mathematics and Natural Philosophy in the same institution, and held this office for seventeen years.

During this time he discharged the duties of his position not only acceptably but with great credit to himself, and promoted the standard of scholarship. From 1827 to 1836 he was at the head of the Gymnasium at Pittsfield, a boys' high school. During this last period, or a portion of it, he was also Professor of Chemistry in the Medical College at Pittsfield, and at the same time held a similar professorship in the Medical College at Woodstock, Vermont.

In these years of active labor as an instructor he was devoting a portion of his time to botanical work, and prepared a "History of the Herbaceous Plants of Massachusetts," which was published by the State. He was also examining and making notes on the Carices, having commenced his "Caricography," his principal botanical writing, in 1824. In 1836 Dr. Dewey came to reside in Rochester as principal of the Rochester Collegiate Institute. In this position he displayed great ability, and organized and conducted the institution in a manner which gave it a wide and honored reputation in educational circles.

His great range of knowledge, and his simple and beautiful life, which appeared devoted to the welfare and uplifting of others, gained him universal respect among his fellow citizens, and his genial and sunny disposition endeared him to all who had intercourse with him. His direct influence reached not only his school pupils but extended to the whole community. By the request of citizens he frequently gave courses of popular lectures in the winter seasons on the subjects of Chemistry, Astronomy, Natural Philosophy and Geology and illustrated them with experiments, apparatus and charts. His role was

that of an educator, but his moral force was never latent or disguised. He was a frequent and acceptable occupant of the various Protestant pulpits of the city, but in the capacity of a moral philosopher rather than a preacher.

His influence for enlightenment and morality was felt throughout the community. He impressed upon his pupils the sacredness of natural law. In his estimation, if the writer may infer from the impression made upon himself as one of his pupils, theology and science walked hand in hand. More than once he has heard a class of young men advised in regard to their course of conduct in life to keep themselves in accord with nature's laws.

Botany was a favored subject in the school curriculum, and it was seldom that a class was lacking to receive his instructions. Up to the year 1850 farming lands and the virgin forests occupied a large portion of the present area of the city of Rochester and therefore the meadows and fields, woodlands and by-ways were easy of access, and the native plants were gathered by many eager collectors. In this way Dr. Dewey examined and re-examined many times the greater portion of the flora of this region, while at the same time he was training up the youth to share his interest in botanical pursuits. The influence which he thus exerted is still perceived by some of the members of the Academy of Science, and it has passed out and onward over a great region, so that a large number of the younger botanists of the present time owe indirectly to Dr. Dewey the interest which they now possess for botanical studies.

Up to the year 1847 the text book of botany in common use was that of Mrs. Lincoln, arranged after the Linnæan method, but Dr. Dewey, who had kept pace with botanical progress, did not allow his pupils to remain in ignorance of the new or natural method of grouping plants which was soon to supplant the old system, and the subject of the natural relations of plants was an important topic in connection with all class-room analyses. When Wood's Class-Book of Botany appeared, which was the first in this country with a flora arranged with the natural orders, it bore the inscription :

'To the Rev. Chester Dewey, M. D., D. D., Professor of Natural Science in the Berkshire and other Medical Institutions, Author of the Report on the Herbaceous Plants of Massachusetts, Monograph on the Carices, etc., etc.

THIS VOLUME
IS RESPECTFULLY DEDICATED, BY
THE AUTHOR."

In the preface the author says: "To the Rev. Professor Chester Dewey, to whom I am permitted to dedicate this volume, I am indebted for that part of the flora which relates to the difficult, yet deeply interesting, family of the Carices. He has not only granted me access to his former excellent monograph of that genus, but has prepared the article for the present work with his own hand."

In 1850 Dr. Dewey was elected Professor of Chemistry and Natural Philosophy in the University of Rochester, which position he occupied until 1860. After this time he still continued his studies and observations and maintained an interest in nearly all scientific subjects until his last days. He died in the eighty-third year of his age, beloved and respected by all who knew him.

In 1868 in connection with a notice of his death the following appeared in the American Journal of Science and Arts, 2 series, XLV. 123:

"Dr. Dewey was an early and a frequent contributor to this Journal upon several subjects, but especially upon that with which his name is inseparably connected—the Carices of North America. His Caricography, commenced in 1824, was continued year after year with few breaks, down to the close of 1866, when it terminated with a general index to species. It is not for us to speak particularly of the merits of this elaborate monograph, patiently prosecuted through more than forty years. This and the monograph of Schweinitz and Torrey laid the foundation and insured the popularity of the study of the Sedges in this country. But while the latter systematic arrangement was published as a whole in 1825, Dr. Dewey's, carried on without particular order, extended through a lifetime, and represents both the earlier and the later knowledge.

"Botany was one of the occupations of Dr. Dewey's leisure hours; his long life was mainly devoted to education. Turning his attention to a special yet almost inexhaustible subject, however, and laboring perseveringly and faithfully, although under many disadvantages, he has permanently and honorably impressed his name upon the science in which the Californian Umbelliferous genus *Deweya* records his services. He was an excellent, simple-hearted, devout man, a fine specimen of the Western New Englander of the old school.

"The lovers of Carex, so numerous in this country, will cherish the memory of these two venerable men, Sartwell* and Dewey, long associated in congenial pursuits and gone to their rest together.

*Dr. Henry P. Sartwell, of Penn Yan, N. Y.

"May the turf of the Sedges they loved, and which cover or ought to cover the low mounds under which their dust reposes, keep them perennially green, and adorn them each returning spring with their sober blossoms."

Following the reading of the Memoir, remarks were made by Professor S. A. Lattimore, the immediate successor of Dr. Dewey, upon the value of the latter's scientific work in the University of Rochester.

Mr. John Walton, whose exhibit of drawings of wild flowers occupied one side of the lecture hall, described his methods and spoke of the advantages of making drawings of plants from nature while pursuing the study of botany.

A collection of pressed ferns belonging to Mr. Charles W. Seelye was exhibited. The fronds, representing about 65 varieties, were all from *Asplenium filix-fœmina* Bernh., and showed great diversities of form. Mrs. J. H. McGuire, Recorder of the Section, called attention to this exhibit and read extracts from the minutes of the Botanical Section (Proc. Roch. Acad. Science, Vol. 2, pp. 238-239) describing these variations.

Professor Henry A. Ward exhibited and described some roots of the mandrake (*Mandragora autumnalis*) procured by him in Syria, which bore more or less resemblance to the human form, and spoke of the ancient fables which have been founded upon similar fancied resemblances.

Professor Charles Wright Dodge exhibited under the microscope a collection of local algæ. In describing them, Professor Dodge said that some of the specimens were of the same species as those which had recently given an unpleasant taste and odor to the Rochester water supply.

Mr. John Dunbar exhibited a large collection of cultivated plants and shrubs grown in Highland park.

A large display of wild flowers occupied a table in the center of the room and embraced most of the more interesting and rarer plants in blossom at this time. Among them were *Utricularia cornuta* Michx., *Calopogon pulchellus* R. Br., *Pogonia ophioglossoides* Nutt., *Sarracenia purpurea* L., *Drosera intermedia* var. *Americana* DC., *D. rotundifolia* L., *Potentilla palustris* Scop., *Nymphæa odorata* var.

minor Sims., and *Arceuthobium pusillum* Peck. The latter was found at Mendon Ponds by Mr. M. S. Baxter, the only station reported in this county.

The formal meeting adjourned at an early hour in order to permit the audience to examine the collections.

October 14, 1895.

The meeting was held in the Lecture hall of the Reynolds Library, the President in the chair. Forty-eight persons present.

The Council report recommended: (1) The payment of a bill. (2) The election as corresponding members of Dr. Anna H. Searing and Dr. Frederick Starr. (3) The election as Fellows of

Mr. M. W. Cooke,
Dr. George W. Goler,
Dr. Charles T. Howard,
Miss Ada M. King,
Dr. J. H. McCartney,
Mr. J. Y. McClintock,
Mr. H. K. Phinney,
Mr. J. E. Putnam,
Mr. F. W. Warner.

The bill was ordered paid and the corresponding members formally elected; the nominations for fellows were laid upon the table, under the rules.

Dr. George W. Goler, as special committee on place of meeting, made an informal report to the effect that arrangements had been made with the Reynolds Library for the free use of the room in which the Society was then convened, and that the Council had chosen this as the place of regular meeting until further notice.

The following letter was read by the President:

October 14, 1895.

Mr. Herman LeRoy Fairchild,
President of the Rochester Academy of Science.

Dear Sir—As the result of a number of years' collecting, exchange, and purchase, I have accumulated a collection of pressed specimens of ferns, of both native and exotic species. A portion of these specimens are mounted on white cardboard 11½ x 16½ inches, the standard herbarium size.

Of North American ferns there are 108 mounted specimens comprised in 23 genera; of exotic species there are 552 mounted specimens in about 130 genera. Besides the mounted specimens there is a considerable number yet unmounted,

both native and foreign, including a collection of the ferns of Colorado and the ferns of Great Britain, the total number being nearly or about 900.* The collection, examination, study, and preparation of these specimens have been for many years an unfailing source of interest and information, It is my desire that this collection shall pass into the possession of the Academy of Science for the use of its members, and I now offer it to the Academy for this purpose. The collection contains most of the Sandwich Island ferns and the ferns of Australia, and many specimens from various parts of the world, such as New Zealand, South Africa, India, Ceylon, South America, Jamaica, and some of the West India islands, and elsewhere. The whole is encased in a black walnut cabinet.

The specimens still unmounted I shall endeavor to mount in the same manner as the others, and I hope still to add many more to them.

Some books and publications relating to the *filices*, and which are named in a list below, and now form a part of my library, I also convey by this writing to the Academy.

LIST OF BOOKS.

Historia Filicum, by John Smith.
The Ferns of North America, by Daniel C. Eaton, containing 81 colored plates.
The British Ferns, by Sir William Jackson Hooker, containing 65 colored plates.
Synopsis Filicum, by Hooker and Baker.
The British Ferns, by George W. Johnson, F. R. H. S.
Our Native Ferns and their Allies, by Underwood, fourth edition, revised.
The Fern Garden, by Shirley Hibbard.
Ferns in their Homes and Ours, by John Robinson.
Hand Book of the Jamaica Ferns and their Allies, by G. S. Jenman.
The Hand Book of Jamaica, containing a list of Jamaica Ferns.
An Atlas to the Coal Flora of Pennsylvania and of the Carboniferous Formations throughout the United States, by Leo Lesquereux, containing numerous plates of the fern flora of the Carboniferous era.
Hawaiian Ferns, by Edward Bailey.
The Ferns of Kentucky, by John Williamson.

Yours very respectfully,

CHARLES W. SEELYE.

The President remarked upon the importance and value of this gift to the herbarium of the Society, and said that appropriate action upon the matter would be taken at a future meeting.

The Librarian reported the addition of about 100 volumes and pamphlets to the Library during the summer.

The following paper, illustrated by maps and charts, was read :

*Subsequent study of the collection by Mr. M. S. Baxter showed that the total number of specimens was nearly 1,500. See report of Curator in Botany at Annual Meeting, January 9, 1900.

THE LACUSTRINE HISTORY OF THE GENESEE VALLEY.

By HERMAN LEROY FAIRCHILD.

(Abstract.)*

The Genesee Valley has a slope from its head in Pennsylvania to Lake Ontario of about 2000 feet. During the Glacial period the receding ice front formed a barrier which obstructed northward the drainage we find at present. The waters, not only from precipitation but derived from the melting ice body, were consequently impounded in the valley south of the glacier and forced into some southward outlet. In the lake history ten stages were described. During the four earliest stages the outflow was to the Allegany river—Mississippi system; the latest and largest of the outlet channels being at Cuba, N. Y., traversed by lines of railway. The fifth and sixth stages correlated with the great channel past Arkport and Hornellsville and contributed waters to the Susquehanna system. The seventh stage had outlet westward across the divide in the neighborhood of Bethany, N. Y., to the great glacial Lake Warren which poured its waters past the site of Chicago to the Mississippi. The eighth stage was the level of Warren waters which invaded the region and occupied the valley up as far as Mt. Morris and Dansville. The ninth stage was Lake Iroquois, with its shore line at the "Ridge Road" and its outlet to the Mohawk—Hudson. This ninth (Iroquois) stage was the last of the glacial waters in the valley, as the tenth or Ontario stage is non-glacial.†

The several water levels have left conspicuous evidences in their eroded outlet channels, deltas of inflowing streams, etc.

All the rock cuttings or ravines in the valley are post glacial, showing diversion of the streams from their preglacial channels which had been filled with drift. The largest examples are the canyons of the Genesee at Portage, Mt. Morris and Rochester. The history of the glacial waters, with the stream activity, is a complex but fascinating and romantic story.

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*The substance of this paper, with map and illustrations, is published in the Bulletin of the Geological Society of America, Vol. 7, pages 423-452, April, 1896.

†Since the above was written the author has discovered phenomena of another water plane below the Warren and above the Iroquois. This was first described as the Geneva Beach in Bull. Geol. Soc. Am. Vol. 8, pp. 281-284. In a later paper, in Bull. Geol. Soc. Am. Vol. 10, p. 56, the water body was called Lake Dana and was correlated with the outlet channel leading southeast from Marcellus village. It was a long pause in the lowering of the hypo-Warren waters by eastward escape to the Mohawk. In the lake succession in the Genesee valley Lake Dana is the ninth stage, making Iroquois the tenth stage.

OCTOBER 28, 1895.

The President in the chair. Twenty-seven persons present.

The announced program of the meeting included reviews in several departments of science.

Professor S. A. LATTIMORE described the newly discovered element Argon, and discussed its nature, its utility, and the manner in which it was discovered.

Professor CHARLES WRIGHT DODGE described some recent experiments by Professor Howells, of the University of Michigan, with reference to the production of the different forms of blood corpuscles.

MR. H. L. PRESTON exhibited and described some newly discovered minerals.

Professor A. L. BAKER discussed some of the aspects of modern mathematical concepts.

NOVEMBER 11, 1895.

The President in the chair. Thirty-one persons present.

The Council report was adopted, which recommended:

(1.) The payment of certain bills. (2.) The election of the following candidates as active members: VICTOR J. CHAMBERS, SAMUEL P. MOULTHROP, FRANKLIN H. BRIGGS. (3.) The election of the following persons as Life Members: MR. CHARLES W. SEELYE, on account of his gift to the Society of his collection of ferns, and REV. JOHN WALTON, on account of his gift to the Society of a collection of local mollusca.

The nomination of certain members as Fellows, which had been presented by the Council October 14 and laid over one month, under the rules, was taken up and the nominees were duly elected.

MR. H. L. PRESTON exhibited some specimens of stalagmitic limestone and so-called Mexican onyx showing mammillary and botryoidal structure.

The following paper, illustrated by material, was read:

DESCRIPTION OF SKULLS OF THE CLIFF DWELLERS OF ARIZONA AND NEW MEXICO.

By Charles H. Ward.

Several persons participated in the discussion of the material.

The following paper was read by the President:

KAME AREAS OF WESTERN NEW YORK.

By Herman LeRoy Fairchild.

(Abstract.)*

This paper was a description of areas of sand or gravel in the region south of Irondequoit and Sodus bays. The largest in area is that occupying the upper part of the Irondequoit valley. South of this, and essentially a portion of it, lies the Victor kame area, with the highest hills in Monroe County. Another interesting area of kames is in the southern part of Monroe County, west of the Irondequoit valley, surrounding the Mendon ponds. The other large area described in the paper lies north of Geneva and includes the Junius ponds.

These localized accumulations of water-laid drift were piled at the ice front during the rapid melting and recession of the glacier by the streams flowing out of the glacier, and mostly in the standing water of the glacial lakes which bathed the ice front.

November 25, 1895.

Held in Anderson Hall, University of Rochester. The President in the chair. Forty-seven persons present.

The following paper was read, illustrated by charts and preparations under the microscope:

THE EVOLUTION OF THE CELL THEORY.

By Charles Wright Dodge.

Following the paper the members were invited to inspect the charts and microscopic preparations.

Mr. Charles H. Ward exhibited a copy of a French work on Anatomy which bore upon the fly leaf the signature of Theodore Schwann, the father of the cell theory.

*The substance of this paper is published in the Journal of Geology, Vol. IV, pages 129-159 Feb.-Mar., 1896, with maps and photographs.

DECEMBER 9, 1895.

The President in the chair. Twenty-six persons present.

The Council report was adopted, which recommended :

(1) The payment of certain bills. (2) The change of the days of meeting from the second and fourth Mondays to the second and fourth Tuesdays of each month, until the summer recess.

Letters were read from Mr. Charles W. Seelye and the Rev. John Walton acknowledging their election as life members.

The following paper was read :

SOME PHASES IN THE CARE OF THE INSANE.

BY EVELINE P. BALLENTINE, M. D.

The paper was discussed by several persons.

JANUARY 14, 1896.

SEVENTEENTH ANNUAL MEETING.

The President in the chair. Forty persons present.

The Council report was adopted, which recommended the payment of certain bills.

The reports of officers for the preceding year were declared in order.

SECRETARY'S REPORT.

The report of the Secretary, PROFESSOR A. L. BAKER, is summarized as follows :

Number of meetings held during the year, 19 ; number of papers read, in Geology, 5 ; in Geography, 2 ; in Zoölogy, 2 ; in Mathematics, 2 ; in Hygiene, 2 ; and one each in Engineering, Mineralogy, Botany, Biology, Economics. Total, 18. This list includes only formal, announced papers.

Number of active members elected, 45. Two corresponding members elected and three transferred from active membership. Two life members elected from active membership. Fellows elected, 10.

Corresponding Secretary's Report.

The Corresponding Secretary, Professor Charles Wright Dodge, reported as follows:

The work of the Corresponding Secretary, as heretofore, has consisted during the past year in the distribution of the copies of the Proceedings and the receipt of publications sent by other societies in return. The labor of wrapping and addressing the Proceedings has been performed by the Librarian, to whom credit should be given. The amount of correspondence relating directly to this office has been small, but has been given such attention as it demanded.

Respectfully submitted,

Charles Wright Dodge,
Corresponding Secretary.

Treasurer's Report.

The Treasurer, Mr. F. W. Warner, made only a verbal report showing the favorable state of the treasury, with a balance on hand of $110.00.

Librarian's Report.

The report of the Librarian, Miss Florence Beckwith, was read as follows:

Since the report read at the Annual Meeting, January 14, 1895, the list of accessions to the library up to March 1, 1895, has been published in Brochure 4, Volume 2, of the Proceedings of the Academy. The list as published contained 1146 volumes and pamphlets.

The library has been constantly growing, and up to January 1, 1896, there have been added 300 volumes and separate publications, distributed among different countries as follows:

United States	104	Holland	2
Canada	12	Italy	13
Mexico	6	Luxembourg	1
Central America	3	Norway	1
South America	1	Portugal	4
West Indies	1	Roumania	1
Austria and Hungary	10	Russia	15
Belgium	16	Sweden	2
France	22	Switzerland	7
Germany	31	Japan	1
Great Britain	12	Australia	5

Contributed by authors..... 30

Very many valuable scientific publications are included in this number.

Respectfully submitted,

FLORENCE BECKWITH,

Librarian.

REPORT OF THE BOTANICAL SECTION.

Read by MRS. J. H. MCGUIRE, Recorder of the Section.

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

The Section has met regularly once in two weeks at the house of Mr. William Streeter, No. 14 Scio street. Twenty-five meetings have been held during the year.

Extracts from the Minutes of the Section.

February 7, 1895. The Section was entertained by Mr. Streeter, who gave a microscopical exhibit of Hemlock water filterings. Among the objects shown were *Fragilaria*, *Euglena*, *Pandorina moreum*, *Asterionella* and others. He also exhibited longitudinal and cross sections of *Pinus Strobus* L., showing the pitted vessels and fibro-vascular bundles. The bast fiber in a piece of macerated wood was also shown.

February 21, 1895. Mr. Streeter continued the study of Hemlock filterings, showing a number of forms of diatoms. The tissues of various plants were also examined.

March 28, 1895. Mr. Streeter resumed the study of Algæ, showing *Pediastrum*, *Scenedesmus*, *Pandorina*, and other species.

April 12, 1895. The topography and flora of Mendon ponds were discussed.

April 25, 1895. On motion it was voted to pay particular attention to the collection and study of *Carices* and grasses during the summer.

May 20, 1895. Mr. Baxter exhibited *Salix myrtilloides* L., *Carex limosa* L., *Scheuchzeria palustris* L., *Arceuthobium pusillum* Peck and *Viola tricolor* var. *arvensis* Hook. from Mendon.

Miss Beckwith exhibited a curiously distorted, gnarled, and intertwined twig of *Berchemia*, presented to the Section by Mr. C. W. Seelye.

June 3, 1895. Mr. Dunbar exhibited several species of exotic

roses under cultivation at Highland Park ; also specimens of pine, showing the stages in the development of fruit occurring in three consecutive years.

July 1, 1895. Dr. Frederick Starr, of Chicago University, by request, spoke on the flora of Mexico, giving some account of a recent visit by him to that country, and saying that it was a wonderful and unworked field for botanists.

Mrs. J. H. McGuire showed *Symphytum asperrimum* Sims, the first time it has been reported in this district.

July 15, 1895. Miss Beckwith reported a new station for *Phlox subulata* L. near Maxwell's station, Livingston county. She also reported finding *Solanum Dulcamara* L. with white blossoms in the same locality.

Mr. Baxter exhibited a plant of *Brasenia peltata* Pursh, not in bloom, from Bushnell's Basin.

August 12, 1895. Mr. Baxter reported *Magnolia acuminata* L. and *Poterium Canadense* Benth. and Hook. at Fisher's station.

Miss Macauley and Miss Beckwith reported *Aster Novi-Belgii* var. *elodes* Gray and *Gerardia purpurea* var. *paupercula* Gray, at Mendon.

August 26, 1895. Miss Beckwith exhibited a "double-flowered" form of *Ranunculus acris* L., found by her in the same place where it had been found by Mr. Fuller thirteen years ago, and *Polygonum sagittatum* L. having peduncles armed with fine, saw-toothed prickles.

September 23, 1895. Miss Beckwith showed specimens of *Aster Novæ-Angliæ* L. with variations in color from nearly white through pink to dark purple.

October 7, 1895. Miss Beckwith showed *Hyssopus officinalis* L. from Pinnacle Avenue.

October 25, 1895. Mr. Baxter brought a twig of *Quercus bicolor* Willd. upon which were eleven leaves presenting a great variety of form. Specimens of hickory nuts were shown by different members, making an interesting study. A typical *Carya sulcata* Nutt. was shown by Mr. Laney.

Miss Beckwith reported a new station for *Geranium pusillum* L. on Monroe avenue near Laburnum crescent.

Mr. Fuller gave some interesting observations on *Acer saccharinum* var. *nigrum* Torr. and Gr., which he had made during the season,

November 8, 1895. Mr. Baxter exhibited a quantity of acorns, and a number of typical forms of *Quercus bicolor*, *macrocarpa*, and *prinus*, were examined.

November 22, 1895. Mr. Dunbar exhibited specimens of seeds of five species of birch, American white, European white, black, yellow, and canoe.

Botanical Curator's Report.

The Academy is fortunate in being again the recipient of large additions to its collection of plants.

Mr. C. W. Seelye, who has made the study of ferns a specialty for many years, has generously presented to the Academy his extensive and valuable collection of American and exotic species, embracing about 900 specimens, many of them rare and nearly all new to our herbarium.

During the past season, members of the Botanical Section have added many specimens of phanerogams.

The herbarium account now stands as follows: Number of mounted specimens, 4295; number of unmounted specimens, over 5300; making a total of about 9,600.

Respectfully submitted,

J. B. Fuller,
Curator in Botany.

Report of the Engineering Section.

Read by Mr. J. Y. McClintock, Recorder of the Section.

At a meeting of the Academy held in the Chamber of Commerce on January 21st an organization was made of an Engineering Section by twenty-two gentlemen present. Mr. Emil Kuichling was elected chairman, and Mr. J. Y. McClintock Recorder, and the proceedings were approved by the Academy of Science on January 28th. On this same date Robert Cartwright was elected First Vice-Chairman and Wm. E. Hoyt Second Vice-Chairman. The membership increased to fifty. Meetings were held on January 28th and on February 4th. By-Laws were adopted on the latter date.

George W. Rafter related interesting incidents of a recent trip in Europe and described the present condition of practice in disposal of sewage and garbage, and of building bridges over canals. An animated discussion followed the paper.

February 18th: Robert Cartwright gave a very interesting and instructive talk, illustrated with black-board sketches, on the "Evolution of Steam Navigation," which was made effective by numerous illustrations drawn from his personal experience in designing and operating marine engines during a period antedating the introduction of the screw propeller and covering active service in the Navy during the Civil War.

March 4th: J. Y. McClintock read a paper on "City Bridges." The paper covered the subject in general and referred particularly to bridges proposed by him for Exchange Street and West Avenue over the Erie Canal. The paper was supplemented with forty lantern views showing the tendency of European practice, and also showing definitely the plans proposed for this city, one being a lift bridge resting on submerged pontoons for Exchange Street, and an overhead fixed bridge for West Avenue. The discussion was participated in by Messrs. Rafter, Jordan, Mosscrop, Kuichling and others.

Mr. Jordan presented a plan for Exchange Street providing for counterweights below the roadway, and for making the bridge of the least possible weight by using plank flooring and providing bearing posts in the center of the canal attached to the bridge so that when raised they fold up against it, so as to be out of the way of boats. The subject was continued to next meeting.

March 18th: Mr. McClintock explained in detail his manner of estimating the necessary force for operating his bridge with submerged pontoons.

Mr. Kuichling brought in a German engineering paper which showed that as early as 1888 the plan of applying submerged floats or pontoons was suggested for a canal lift to take the place of locks. The discussion was continued by Messrs. Kuichling, Mosscrop, Skinner, Fisher and Rafter.

April 1st: Upon reading of the minutes Mr. Kuichling said that they should be amplified so as to show, what was the fact, that he had presented the German periodical, not to show that the idea of pontoons as applied to lift bridges by Mr. McClintock was not original, but rather to endorse the practicability—by showing that it had been urged for application to far more important works, and that he believed the idea to be original with Mr. McClintock as claimed by him, although the record showed that it had been originated previously for other applications, and that Mr. McClintock was entitled to credit for conceiving the plan.

William F. Jordan read a very interesting paper on "Stone Masonry," illustrating upon the blackboard the methods employed to determine the stability of retaining walls and for proportioning same, and also describing experience on the Buffalo, Rochester and Pittsburg R. R. in repairing defective masonry piers by filling with cement grout. The paper was discussed by Messrs. Cartwright, Skinner, Brotsch, Kuichling, Fisher, Thompson, Munger, Story, Raymond and McClintock.

April 14th: Mr. Kuichling spoke of the death of Mr. John Bisgood, Engineer of the Western Division of the Erie Canal and a member of the Section, and on motion of Robert Cartwright the following resolutions were adopted:

"*Resolved*, That by the death of John Bisgood we are deprived of an esteemed associate member, who was a good citizen, a sympathetic friend, a warm hearted comrade, a considerate chief, an entertaining companion, an experienced civil engineer and an honest man, and it is fitting for us to note upon our records this tribute of respect, together with an outline of his life.

"*Resolved*, That a copy of these resolutions be sent to the family of our deceased member and associate, and be published in the daily papers of this city, and entered upon the records of the Rochester Academy of Science."

John Bisgood was born in Ireland 72 years ago. He came to this country when 18 years old, locating at Albany, and securing a position as draughtsman in the office of the state engineer. From then to the time of his death he was employed upon the state canals, excepting the years when he was in the army.

Mr. Bisgood did his duty as a patriotic citizen by serving with distinction during the Civil War as a member of Company A, Third New York Cavalry, and was present at all the engagements in which his regiment took part.

His ability as an engineer was recognized by gradual promotion, and for the past five years he has been division engineer of the New York state canals.

Gaylord Thompson read a paper describing the Otis Elevating Cable Railway up the eastern slope of the Catskill Mountains, 7,000 feet long with a rise of 1,630 feet and maximum grade of 34 per cent. The paper was especially instructive in showing how the inclination of slope could be so varied that the pull of the down cars would vary as the weight of the counterweighting cable and car diminish. Remarks were made by Messrs. Kuichling, Cartwright and Jordan.

May 6th: Edwin A. Fisher read a paper on the "Story of a Canal Changed into a Railroad," being a carefully prepared and valuable paper upon the Genesee Valley Canal which was displaced by the present Western New York and Pennsylvania R. R. The paper was most interesting and contained the record of much valuable experience as to train resistance of curves and grades, and length of life of wooden bridges and railroad ties, also practical methods of increasing strength of wooden bridges to accord with increased weight of rolling stock. The paper was illustrated with plans and diagrams and by photographs taken by Mr. C. R. Neher.

May 20th: Frank L. Dodgson read an instructive paper on "Railway Signals," especially showing the development of the latest improved interlocking systems.

June 3rd: Informal meeting and discussion.

July 10th: About a dozen members of the Section made an excursion to Syracuse and enjoyed a very beautiful day in examining street improvements and the new distributing reservoir, with a drive to Warner's and an inspection of the works of the Empire Portland Cement Co., also taking in on the way the Wm. A. Sweet Steel Works.

Since that date no meetings were held until January 6th, 1896, when a meeting was held and devoted to conversation, more especially upon electricity.

A resolution was adopted asking the Academy to print in their proceedings such papers as were prepared for this Section and corrected for publication by their authors.

Election of Officers.

The annual election of officers of the Society for the ensuing year was held with the following result:

President, Herman LeRoy 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, { Adelbert Cronise, J. Y. McClintock, } *until 1899.*

The following paper was read:

THE SANITATION OF ROCHESTER.*

By George W. Goler, M. D.

This paper was illustrated by charts showing the prevalence of various diseases in different parts of the city during a series of years.

January 28, 1896.

The meeting was held in the Physical Laboratory, University of Rochester.

The President in the chair. Twenty-four persons present.

The following paper, with lantern illustrations, was read :

MEASUREMENT OF HIGH TEMPERATURES.

By Henry E. Lawrence.

February 11, 1896.

The meeting was held in the hall of the Chamber of Commerce.

The President in the chair. Forty persons present.

The Council report was adopted, which recommended :

(1) The payment of certain bills. (2) The election of Mr. D. L. Covill as active member. The appointment of the following Curators :

In Biology, Charles Wright Dodge.
In Botany, Joseph B. Fuller.
In Conchology, John Walton.
In Entomology, Charles T. Howard.
In Geology, Clifton J. Sarle.

The President announced that the scientific program of the meeting was to be held under the direction of the Engineering Section.

The chair was then assumed by the Chairman of the Section, Mr. Robert Cartwright.

The following paper was then read :

*An abstract of this paper is printed in the Rochester Democrat and Chronicle, January 15, 1896.

THE ELECTRICAL EQUIPMENT OF A MODERN COMMERCIAL BUILDING.

By Joseph E. Putnam.

The paper was illustrated by the electrical appliances used in lighting, heating, ventilating and supplying power to the Chamber of Commerce building.

Following the reading of the paper the members were conducted through the building to inspect the various electrical apparatus.

February 25, 1896.

The President in the chair. The usual audience present.

In the absence of the Secretary, Mr. H. L. Preston was appointed Secretary *pro tem.*

Mr. J. M. Davison exhibited an unusual form of quartz from Greenfield, Saratoga county, New York. This was a nodular and radiated mass, the size of a chestnut, derived from a Laurentian gneissoid rock which had been altered by contact with a dyke. Its hardness 6 to 7, infusible, opaque before blowpipe, partly decomposed in HCl. without gelatinizing. The analysis yields quartz 93.75, alumina 6., with a trace of iron and water.

Mr. Preston thought the mineral was probably a pseudomorph of quartz, perhaps one of the zeolites, which frequently occur in radiated forms.

The President exhibited a picture of a fossil neuropterous insect of gigantic size.

The following paper was presented :

ANALYSIS OF THE KESEN METEORITE.

By J. M. Davison.

This meteorite, which fell in the village of Kesen, Japan, on the 13th of June, 1850, is described by Prof. Henry A. Ward in the Proceedings of this Academy for 1892, Vol. 2, Brochure 2, p. 171.

The analysis here given was completed after the publication of

Prof. Ward's paper, three separate determinations being made.

1st. Of the portion soluble in HCl.

2nd. Of the portion insoluble in HCl.

3rd. Of the metallic portion separated from the mass by the magnet.

From these analyses that of the entire mass was calculated.

The percentage of nickel (10.05) in the metallic portion is above the average.

	Entire Mass. (computed.)	Soluble in HCl. 31.68	Insol. in HCl. 51.79	Metallic. 16.53
SiO_2	36.24	7.35	64.15	....
Fe	13.00	.....	.....	87.22
Fe_2O_3	18.04	45.32	6.97	.....
Al_2O_3	3.34	1.63	5.35	.....
P_2O_5	0.36	0.10	....	(P.) 0.12
Ni	2.13	2.00	.....	10.05
Co	0.12	0.17	.....	0.46
CaO	2.35	1.68	3.49	....
MgO	22.54	41.58	17.80	.....
S	1.53	0.19	.....	1.56
Na_2O	0.34	.....	1.27	...
K_2O	0.01	.....	0.05	.....
	100.	100.02	99.08	99.41
Less O. for S		.10		
		99.92		

Rochester, N. Y., Jany., 1894.

The following paper was read by MR. E. G. BARNUM:

THE PINNACLE PEAT MARSH.

BY H. L. FAIRCHILD AND E. G. BARNUM.

Within the limits of the city of Rochester is an interesting peat marsh apparently in a state of nature, and covered with a forest growth which may be primeval. It occupies one of the numerous depressions or basins found in the Pinnacle hills, and is situated about forty rods east of the South Goodman street extension through the ridge. In shape it is oblong or oval with its longer diameter east and west. Its dimensions are about three hundred feet east and west by

one hundred forty feet north and south. An abrupt high bank extends from the west end around the south side. The northern bank is lower with a more gentle slope, and separates the peat marsh from a lakelet on the northwest, near Goodman street, and from one still smaller directly north.

The unobservant eye would probably see nothing unusual or interesting in this depression, as the surface is covered with a growth of yellow birch and herbaceous plants, such as grow in moist woods. Investigation, however, reveals the interesting fact that the material beneath the forest mold is a deep accumulation of peat which has undoubtedly filled the basin once occupied by a morainal lake.

In the autumn of 1895 the attention of the class in Physical Geology of the University of Rochester was directed to this marsh, and an investigation of the deposit was made by the junior author, assisted by Mr. R. B. English and Mr. C. J. Sarle. On October 22d, 1895, a small excavation was made by shoveling out the peat to a depth of thirteen feet. From the bottom of this pit a pole was thrust and driven twelve feet deeper. At this point it was evident that something more solid than the peat was reached by the end of the pole. Assuming the obstruction to be the bottom of the depression would give the peat a thickness of at least twenty-five feet.

Below the plane of partial oxidation the peat is of a reddish yellow or dull straw color when first removed. It is mainly coarse in texture, showing distinctly its fibrous structure and vegetable origin. The vertical section of the deposit is quite uniform in appearance, with the exception of three narrow bands. Two of the latter, made up of small brownish sticks or woody rootlets, are about three inches thick and occur at a depth of three feet four inches and six feet respectively. The third streak occurs at depth of eight and one-half feet. This is darker in color and finer grained than the rest of the mass, and seems to be the result of greater decomposition at that point.

At a depth of six feet was found a pebble of quartzite. There was no trace of an opening having been made through which this might have fallen, and the peat fibres curved around it in such a way as to indicate that it had been dropped into the bed when the peat was forming at that plane, and previous to the laying down of the superincumbent mass. It seems not unreasonable to attribute the occurrence of the pebble to human agency, as the upper six feet of vegetable accumulation may have formed since the occupation of this region by the aborigines. At nine feet below the surface was found

what was believed to be, from examination made at the time, a seed of the basswood. Unfortunately this was broken in the examination and the parts lost. At six feet eleven inches was found a stick about one and one-half inches in diameter, with the bark intact, which was supposed to be a branch of yellow birch. At a depth of about ten feet, and extending obliquely downward, occurred a tree limb about four inches in diameter. This was identified by Professor W. W. Rowlee, of Cornell University, from specimens sent him, as *Acer rubrum*. Several specimens of peat were also sent to Professor Rowlee, who reported that the specimen taken from a depth of nine feet contained leaves and stems of the large cranberry (*Vaccinium macrocarpon*). These stems penetrate to some extent throughout the mass. Perhaps the two streaks of stems and roots mentioned above are the result of the cranberry having had complete possession of the bog at periods corresponding to those layers. It may also be added that Mr. Gardiner, who has charge of the grounds containing the marsh, states that he has dug cranberry plants from this bog for shipment.

Professor Rowlee also states that intact specimens of the roots of a sedge (probably *Carex filiformis*) were found in the peat, and that the minute fibers which are so abundant as to be the main material are the vascular elements of similar rootstalks.

An analysis of the peat made by Mr. Edward Hirshfield for the percentage of absorbed moisture and ash gives the following results:

	Moisture.	Ash.
Specimen A, from surface,	14.47%	2.15%
" B, " a lower depth,	14.23%	3.05%
" C, " still deeper,	14.51%	5.08%

The basin occupied by this peat marsh is of the kind characteristic of glacial deposits, and known as "kettles." The form and relation of the ridges surrounding the basin together with the depth of the latter suggest that it was probably the locus of a buried ice block.

The ridges about the basin are gravel and sand, but evidently the bottom and walls are of less pervious materials. The bottom may not be far above the limestone rock and must be floored by either rock or till. The basin was probably at first a lakelet with level perhaps below the present top of the marsh. Higher accumulation of the peat seems to have been prevented by the inability of the basin

walls to permanently retain the water at any higher level. That water stands for a time over the marsh is proven by the growth of the birches which have all developed "knees" in order to carry the trunks above water.

The letter of Professor Rowlee is here appended.

ITHACA, N. Y., Oct. 28, 1895.

My Dear Professor Fairchild: I received your letter and also the box of specimens Saturday and have examined the material to-day.

The large piece from a depth of nine feet had leaves and stems of the large cranberry (*Vaccinium macrocarpon*). The leaves are so characteristic that I do not believe there can be any mistake about them. Although I did not find them connected with the stem, I feel very sure that the little brown sticks running through the mass are cranberry stems, they have such a fixed habit of sending out superimposed roots at their nodes.

The minute fibers running all through the mass are the vascular elements of the rootstocks and roots, a few of which occur intact in the specimen. These are from a species of sedge, I think, but just which species I do not certainly know. All the circumstances point to its being *Carex filiformis*, a plant which now is one of our most effective bog-builders.

Here, as in other specimens, I have been surprised in not finding organized remains of sphagnous moss. In no case yet have I yet found it in specimens taken from considerable depth. It seems to wholly decompose and disintegrate.

The block of wood from a depth of eight feet is *Acer rubrum*.

The specimens from eleven feet have, so far as I can see, the same materials as those from nine feet. Oxidation has blackened the fibers much more, however.

The specimen from nine feet has a large leaf which I cannot at present identify. Its margin is gone and the venation is not sufficiently preserved to be traced. It is pierced by numerous fibers which shows pretty conclusively that the fibers pertain to underground parts. * * * * *

Sincerely yours,

W. W. ROWLEE.

The following paper was read by the author:

A CITY'S NEGLECT OF A GREAT OPPORTUNITY.*

BY J. Y. MCCLINTOCK.

This paper dealt with two engineering problems prominently before the citizens of Rochester, namely: the enlargement of the section of the Erie canal through the city of Rochester, and the water storage of the Genesee river. The paper called attention to the necessity of the city safeguarding its own interest, and of anticipating any engineering plans which might be framed by the authorities to the detriment of the locality.

*The paper is published in full in the Rochester Democrat and Chronicle, February 26, 1896.

At the close of the paper, Mr. McClintock presented the following resolutions :

"*Resolved*, That the Rochester Academy of Science recommends to the Common Council that they should make an effort to secure the adoption of a plan for improving the Erie canal which will insure a sufficient supply of water without drawing upon the Genesee river, and which shall not make necessary the raising of the streets crossing over the canal in the city."

"*Resolved*, That the Rochester Academy of Science recommends to the Common Council that, in view of the difficulty of forming an intelligent opinion as to the best method of carrying through the project for controlling the flow of the Genesee river, it would be advisable to have a local commission to employ experts and report a plan for carrying it out in such a manner as to be of the greatest benefit to the whole community."

The paper and the resolutions gave rise to an animated debate. The resolutions were by vote referred to the Engineering Section.

MARCH 10, 1896.

The meeting was held in the Physical Laboratory, University of Rochester.

The President in the chair. One hundred five persons present.

The Council report was adopted which recommended :

(1) The payment of certain bills.

(2) The election as active members of the following candidates : JOHN H. FINNEY, HOWARD L. OSGOOD, GEORGE W. KNAPP, DANIEL D. TOMPKINS, GEORGE F. CHISM.

The following paper was read :

ROENTOGRAPHY—THE NEW PROCESS OF MAKING NEGATIVES.*

BY HENRY E. LAWRENCE.

The paper was illustrated by apparatus used in making the negatives, and by the making of actual prints of the human hand and other objects during the delivery of the paper.

*The paper is published in full in the Rochester Democrat and Chronicle, March 11, 1896.

MARCH 24, 1896.

The President in the chair. Thirty-two persons present.

Mr. C. R. Neher exhibited a specimen of flexible sandstone, itacolumite, from North Carolina.

Mr. J. G. D'Olier exhibited a number of grooved and perforated fragments of shale from Grand Isle, Vermont. There was some discussion over the objects, as to whether they were natural or artificial.

The following paper, illustrated by numerous examples, was read :

MINERAL PSEUDOMORPHS.

BY H. L. PRESTON.

The Rev. G. S. Robinson, of Scottsville, exhibited several curious tablets and other relics stated to have been found in ancient mounds in Michigan. The specimens gave rise to considerable discussion as to their genuineness and antiquity.

Mr. E. P. Clapp, of North Rush, exhibited a pipe found in excavation at Scottsville. The front of the bowl was ornamented with a human head, not of Indian type, and above the back of the bowl was the head of an animal, suggesting a wildcat.

Mr. A. E. Dumble showed a mound builder's pipe of stone, and a silver cross with a circular pendent shield engraved with the totem of a bear, found at Rice Lake, Canada.

The following paper was read by title :

PUFF BALLS, SLIME MOULDS AND CUP-FUNGI OF ORLEANS COUNTY, NEW YORK.

BY DR. CHARLES E. FAIRMAN.

Revised October, 1899.

The fungi enumerated in this paper were mostly collected at Lyndonville, N. Y. The list runs on consecutively from number 126 in my "Hymenomyceteæ of Orleans County," Proceedings Rochester Academy of Science, volume II, page 154.

The present list embraces species classed by mycologists under Gasteromyceteæ, Myxomyceteæ and Discomyceteæ. I have added a few Mucoraceæ found in this locality, although other Mucors have been seen but not specifically identified.

Some of the species are new to the State of New York, and one, viz.: *Tapesia Rhois*, is considered new to science. In the enumeration of the Gasteromyceteæ and Discomyceteæ the arrangement of Saccardo in the "Sylloge Fungorum" has been followed. A manual of the North American Discomyceteæ is sadly needed. Many of the species now recognized need careful revision and elimination. Cooke's list was published in 1875 and is not up to date. (Cooke, "Synopsis of the Discomycetous Fungi of the United States," Bull. Buffalo Soc. Nat. Sc.)

Delay in the printing of this paper has given me opportunity to revise the Myxomyceteæ in accordance with the "North American Slime-Moulds" of Prof. T. H. Macbride (Macmillan, 1899.)

GASTEROMYCETEÆ.

Family 1. PHALLOIDEÆ.

Sect. 1. PHALLEÆ.

A. PHALLEÆ MITRATÆ.

ITHYPHALLUS Fries.

127. **Ithyphallus impudicus** (L.) Fries. Peck, 28th Rep., page 85. Stink-horn, so-called from its very offensive odor. Figured in Wood's "Reference Handbook of the Medical Sciences," vol. 3, page 273, and Zopf, Die Pilze, page 381. Flats along Johnson's Creek, Yates, Oct. 1888.

B. PHALLEÆ CAPITATÆ.

MUTINUS Fr.

128. **Mutinus caninus** (Huds.) Fr. The superior part of the stipe is of a beautiful peach-blossom color. Near barns, Lyndonville. Uncommon.

Family 2. NIDULARIACEÆ.

*Peridium lacerate at the apex (not operculate).

NIDULARIA Fr.

129. **Nidularia pulvinata** (Schwein.) Fr. Peck, 30th Rep., page 51. Chestnut or bay-colored Nidularia. On wood in wood piles, Lyndonville, August, 1886. Peck found it in October on old fence boards. (Zopf in Die Pilze, page 378, gives the genus habitat as 'alte Baumstümpfe und Hölzer"). Rare. Both Prof. Peck and Mr. Ellis assure me that this fungus is uncommon in this country.

* * Peridium with a deciduous operculum.

CYATHUS Hall.

130. **Cyathus vernicosus** (Bull.) DeCand. Peck, 22nd Rep., page 90. Zopf, Die Pilze, Fig. 88. Bird's-nest fungus. (Nestfrüchtig Bauchpilz, Ger.) On the ground. Lyndonville. Uncommon.

CRUCIBULUM, Tul.

131. **Crucibulum vulgare** Tul. Peck, 22nd Rep., page 90. Bennett and Murray, Crypt. Bot., Figs. 327, 328. Zopf, Die Pilze, page 376. Little crucible fungus, from its resemblance to a chemist's crucible. On ground. Common.

Family III. LYCOPERDACEÆ.

Sub-Family 2. DIPLODERMEÆ.

GEASTER Mich.

132. **Geaster limbatus** Fr. Peck, 44th Rep., page 23. Morgan in "North American Geasters," Journal of Mycology, vol. 1, page 7. Trelease, "The Morels and Puff Balls of Madison, Wis.," page 109. Fringed Earth-star. Under hedge rows, Lyndonville.

Sub-Family 3. LYCOPERDEÆ.

BOVISTA Dill.

133. **Bovista pila** B. and C. Peck, 30th Report N. Y. State Museum, page 49. Trelease, "The Morels and Puff Balls of Madison," page 111, and Plate VII., Fig. 6. Our specimen has the peridium smooth, shining, black. Trelease says, loc. cit., that it "is excellent eating when gathered young and properly cooked." On ground in pastures, Lyndonville. Not common.

LYCOPERDON Tourn.

134. **Lycoperdon gemmatum** Batsch. Peck, 22nd Rep., page 88. Trelease, loc. cit., page 114. Wood's "Reference Handbook Med. Sc.," page 281. Figured by Trelease, loc. cit., Plate VIII., Fig. 1. Warty Puff Ball.

135. **Lycoperdon Wrightii** B and C. Peck, 22nd Rep., p. 88. Trelease, loc. cit., page 114, and Plate VII., Fig. 8. Wright's Puff Ball. Spiny Puff Ball. Lyndonville.

136. **Lycoperdon pyriforme** Schaeff. Peck, 22nd Rep., page 88. Trelease, loc. cit., page 115, and Plate VIII., Fig. 5. Pear-shaped Puff Ball. Common on buried sticks. Zopf, Die Pilze, page 371, says that this is the most common representative of the Puff Balls in Germany.

137. **Lycoperdon hirtum** Mart. Peck, 46th Report, page 9. Prof. C. H. Peck refers our specimens to this species and says 'scarcely different from Lycoperdon atropurpureum Vitt., with which : was united in my article on U. S. Lycoperdons, except in its ord-like root." Lyndonville. Uncommon.

138. **Lycoperdon Bovista** Linn. Lycoperdon giganteum Batsch and Lycoperdon Proteus Sow. are synonyms. Peck, 23rd Report, page 53. Trelease, loc. cit., p. 113. Excellently illustrated n Peck, 23rd Rep., Plate I., Fig. 1. Also fig. in Wood's "Reference Handbook," vol. 3, fig. 1373, and in Rep. Dep't of Agric., 885, Plate II., Fig. 11. Everywhere known as Giant Puff Ball. In pastures and along fences, often attaining a large size. Taylor, Rep. J. S. Agric. Dept. says it grows "in great abundance on Genesee Flats in Livingston County, New York." Said by mycologists from ll countries to be edible when young, white and creamy. Thus, Vittadini from Italy sings its praises. Zopf from Germany says 'essbar und wohlschmeckend." (Die Pilze, p. 371.) Cooke, an English authority, says it is an excellent addition to the breakfast able, and Peck, N. Y. State Botanist in 23rd Report says "its edible ualities have been by no means overestimated." A more extended otice of this Puff Ball may be found in Prof. Peck's article on 'Edible and Poisonous Fungi of N. Y." in the 48th Report, and a ine full page plate illustrating this species accompanies the article. The smoke of burning Puff Balls is used for stupefying bees. For heir hemostatic and anæsthetic properties the reader may consult the 'National Dispensatory," Art. Lycoperdon.

MYXOMYCETES (Link) DeBary.

(Slime Moulds.)

3. **SAPROPHYTES**.

a.	With free spores,	EXOSPOREÆ.
b.	Spores in receptacles, or sporangia,	MYXOGASTRES.

Sub-Class EXOSPOREÆ Rost.

CERATIOMYXA Schröter.

139. **Ceratiomyxa fruticulosa** (Müll.) Macbride. Macbride, N. A. Myx., page 18, plate I., figs. 7 and 7 *a*. *Ceratium hydnoides* A. and S. in Peck's 26th Rep., Page 78. Common on moist, rotting wood.

Sub-Class MYXOGASTRES (Fries) Macbride.

MYXOMYCETES proper.

Order I. PHYSARACEÆ.

FULIGO (Haller) Pers.

140. **Fuligo ovata** (Schaff.) Macbr. Macbride, loc. cit., p. 22, plate X., fig. 2, 2*a*, 2*b*. *Fuligo varians* Sommf. in Peck, N. Y. Myx., 31st Rep., p. 57. *Fuligo septica* (Link) Gmel., in Sacc. Syll., vol. VII., page 353. On stumps in an apple orchard, Lyndonville, July, 1889.

PHYSARUM (Pers.) Rost.

141. **Physarum contextum** Persoon. Macbride, loc. cit., page 31, plate IX., figs. 3 and 3*a*. Peck, 31st Rep., p. 55, 46th Rep., p. 30. Sacc. Syll., vol. VII., p. 342. Lyndonville, June, 1889.

TILMADOCHE (Fries.) Rost.

142. **Tilmadoche alba** (Bull.) Macbr. Macbride, loc. cit., page 58. *T. nutans* Pers., in Peck, N. Y. Myx. 31st Rep., page 55. Sacc. Syll., vol. VII., p. 359. In *Sphagnum* woods, Yates, June, 1899.

LEOCARPUS (Link) Rost.

143. **Leocarpus fragilis** (Dickson) Rost. Macbride, loc. cit., p. 81, plate VIII., figs. 3, 3*a*, 3*b*. Peck, N. Y. Myx., 31st Rep., p. 56. Sacc. Syll., vol. VII., p. 358. (*Diderma vernicosum* of some). On bark, Lyndonville, June, 1889.

DIDYMIEÆ.

DIDYMIUM (Schrad.) Fr.

144. **Didymium Fairmani** Saccardo. Fairman in Notes on New or Rare Fungi from Western N. Y., in Jour. of Mycol., vol. V., page 78. Also in Proc. Roch. Acad. Sci., vol. I., p. 78, with plate 3, figs. 7, 8, 9. On under side of leaves of *Unifolium Canadense* (Desf.) Greene, false lily-of-the-valley, Ridgeway, N. Y., Aug., 1886. The larger portion of the original collection was sent to Prof. P. A. Saccardo, Padua, Italy, for identification, and having mislaid the fragment which I retained, I was unable to send Prof. Macbride a specimen for revision. For this reason this Didymium is not in Prof. Macbride's N. A. Myxomycetes.

Order II. STEMONITACEÆ.

STEMONITIS (Gleditsch) Rost.

145. **Stemonitis fusca** (Roth) Rostafinski. Macbride, loc. it., p. 115. Peck, N. Y. Myx., 31st Rep., p. 56. Sacc. Syll., vol. VII., p. 397. Bennett and Murray, Crypt. Bot., fig. 334. On rotten logs, Lyndonville. Rather common. The peridia of this fungus drop off easily and leave nothing but a long, filiform, black stipe, which is seated on a common hypothallus, of a dark color. In this condition it looks like a mass of upright black hairs on a thin, black crust.

COMATRICHA (Preuss) Rost.

146. **Comatricha stemonitis** (Scop.) Sheldon. Macbride, loc. cit., p. 130 and plate VI., figs. 1, 1*a*, 1*b*, 3*c*, 3*d*. *Comatricha typhina* Roth. in Peck, N. Y. Myx., 31st Rep., p. 56. Sacc. Syll., vol. VII., p. 394. (*Stemonitis typhoides* DC. in Peck, 25th Rep., page 83.) Peck found it on rotten stumps. Berlese in Sacc. Syll., vol. VII., p. 395, gives its habitat as rotten wood. I found it at Lyndonville in 1890 on horse manure.

Order III. CRIBRARIACEÆ.

C. TUBIFEREÆ.

TUBIFERA Gmelin.

147. **Tubifera ferruginosa** (Batsch) Macbride. Macbride, loc. cit., p. 157, and plate I., fig. 4; plate VII., fig. 8. Sacc. Syll., vol. VII., p. 406. Peck, 31st Rep., p. 56. This is *Tubulina cylindrica* (Bull.) var. *acuta* Peck in Fairman, Fungi of Western N. Y., Proc. Roch. Acad. of Science, vol. I., page 53. In the Sylloge Fungorum, loc. cit., the peridia are described as "apice rotundatis." The late Dr. George A. Rex wrote me as follows: "the form of Tubulina with acute apices is common with us, in fact we have Tubulina in shapes from flat to acute points." Prof. Macbride says that "the peridia are sometimes acuminate, and widely separate above. This is Persoon's *T. fragiformis*."

E. CRIBRARIEÆ.

CRIBRARIA (Pers.) Schrader.

148. **Cribraria tenella** Schrad. Macbride, loc. cit., p. 167, plate XVII., fig. 5. Sacc. Syll., vol. VII., p. 414. On hemlock logs, Lyndonville, 1890.

149. **Cribraria purpurea** Schrad. Macbride, loc. cit., p. 169. Peck, N. Y. Myx., 31 Rep., p. 56. Sacc. Syll., vol. VII., p. 413. On rotten log, Lyndonville, May, 1887. Easily recognized by its purple color.

150. **Cribraria vulgaris** Schrad. Peck, 32 Rep., page 38. Sacc. Syll., l. c., p. 414. On rotten wood, Lyndonville, June, 1888.

DICTYDIUM (Schrad.) Rost.

151. **Dictydium cancellatum** (Batsch) Macbride. Macbr., loc. cit., p. 172, plate I., figs. 6, 6*a*. *Dictydium cernuum* Pers., in Peck. N. Y. Myx., 31st Rep., p. 56. *D. cernuum* (Pers.) Nees in Sacc. Syll., vol. VII., p. 410.

Order IV. LYCOGALACEÆ.

LYCOGALA Micheli.

152. **Lycogala epidendrum** (Buxb.) Fries. Macbride, loc. cit., page 175. Peck, N. Y. Myx., 31st Rep., p. 57. Sacc. Syll., l. c., p. 435. Common on stumps in woods. Often seen in its early state on account of the bright scarlet color of the immature plasmodium.

Order V. TRICHIACEÆ.

B. PERICHÆNEÆ.

PERICHÆNA Fries.

153. **Perichæna corticalis** (Batsch) Rost. Macbr., l. c., p. 185, plate II., fig. 1. Peck, N. Y. Myx., 31 Rep., p. 57. Sacc. Syll., l. c., p. 420. On bark of fire wood in piles, Lyndonville, 1886.

C. ARCYRIEÆ.

ARCYRIA (Hill) Pers.

154. **Arcyria nutans** (Bull.) Grev. Macbr., l. c., p. 191, plate II., fig. 6. Peck, l. c., page 57. Sacc. Syll., l. c., p. 429. On rotting fence, Lyndonville, June, 1889.

155. **Arcyria denudata** (Linn.) Sheldon. Macbride, l. c., p. 195, plate II., figs. 5, 5*a*. *Arcyria punicea* Pers., in Peck, l. c., page 57. Sacc. Syll., l. c., page 426.

E. TRICHIEÆ.

HEMITRICHIA Rost.

156. **Hemitrichia vesparium** (Batsch) Macbride. Macbride, l. c., p. 203. This is the well known *Hemiarcyria rubiformis* (Pers.)

Rost., under which name it was listed in Peck, l. c., page 56, and Sacc. Syll., l. c., page 447. On rotten log, May, 1888.

157. **Hemitrichia clavata** (Pers.) Rost. Macbr., l. c., page 106, plate III., figs. 1, 1*b*. *Hemiarcyria*, Peck, l. c., page 56. Sacc. Syll., l. c., page 447.

TRICHIA (Haller) Rost.

158. **Trichia favoginea** (Batsch) Pers. Macbr., l. c., p. 114, plate IV., figs. 5, 5*a*, 5*b*. *Trichia chrysosperma* (Bull.) in Peck, l. c., page 56. Sacc. Syll., l. c., p. 442. On rotten wood.

159. **Trichia decipiens** (Pers.) Macbride. Macbr., l. c., p. 118. *T. fallax* Pers., in Peck, l. c., page 56, and Sacc. Syll., l. c., p. 439. On rotten log in woods, Lyndonville, Oct., 1899.

MUCORACEÆ DeBary.

Sub-Family 2. MUCORÆ Van Tiegh.

MUCOR Mich.

160. **Mucor Mucedo** Linn. Common everywhere on decaying fruit and vegetables, as well as various putrescent organic substances. For synonyms see Roscoe Pound, "Revision of the Mucoaceae," Minnesota Botanical Studies, Bulletin No. 9, page 93.

161. **Mucor Tæniæ** Fairman. Proc. Roch. Acad. of Science, vol. I, page 52, and plate IV., figs. 4, 5, 6. On segments of Tape Worm, Lyndonville.

RHIZOPUS Ehr.

162. **Rhizopus nigricans** Ehr. *Mucor stolonifer* Ehr. *Aseophora mucedo* Tode, in Pound's Revision, page 98. Name from the Greek *rhiza*, root, and *pous*, foot, i. e. root-footed, on account of the resemblance of the rhizoids to a root-system. For the same reason the fungus is called by the Germans "wurzelfuss." Nigricans —blackish, referring to the color of the sporangium, which becomes dark colored when the spores mature. For information as to structure and life history the reader is referred to: Underwood, "Moulds, Mildews and Mushrooms," p. 24, plate 2, fig. 3. C. J. Chamberlain, Our. App. Micros., p. 547, fig. 26. Bennett and Murray, Crypt. Bot., p. 338. Zopf, Die Pilze, p. 316 and fig. 6. On grapes in baskets at the markets, Medina, N. Y., Jan., 1891. The appearance of the grapes was much injured by the fungus. Albert F. Woods, acting Chief of the Division of Vegetable Pathology, U. S. Dept. Agric.,

wrote me as follows: "In regard to *Rhizopus nigricans* on grape, I have to say that it is very common not only on grapes which have been kept too moist and have thus started to decay, but also upon all other kinds of fruit. It is not strictly a parasite and I doubt whether it can be considered as at all parasitic, although after it starts on a bruised or broken berry it hastens decay. The only way to prevent it is to keep the berries dry and remove all broken berries."

DISCOMYCETEÆ Fr.

Fam. HELVELLEÆ Sw.

MORCHELLA Dill.

163. **Morchella esculenta** (Linn.) Pers. Peck, 28th Rep., p. 87, and 48th Rep., p. 124, plate III. Phillips, British Discomycetes, pages 3 and 4. Sacc. Syll. Disc., p. 8. Common Morel. Edible. Early spring.

Fam. PEZIZEÆ Fr.

ACETABULA Fr.

164. **Acetabula vulgaris** Fuckel. Phill. Br. Disc., p. 44. Sacc. Syll. Disc., p. 59. Sporidia elliptical, hyaline, 12-14 x 6-7 μ. Cellars. Lyndonville.

PEZIZA Dill.

165. **Peziza griseo-rosea** Gerard. Peck., 29th Rep., page 54. Sacc. Syll. Disc., p. 77.

SARCOSCYPHA Fr.

166. **Sarcoscypha coccinea** Jacq. Peziza, Peck in 23 Rep., p. 62. Lachnea, Phill. Br. Disc., p. 203. Early and beautiful. Woods, on sticks, etc. Yates and Ridgeway, common.

LACHNEA Fr.

167. **Lachnea scutellata** Linn. Pez. in Peck, 22 Rep., p. 94. Phill. Disc., p. 223. Sacc. Syll. Disc., p. 173. Common on rotten wood and buried sticks among leaves. Yates and Ridgeway.

HELOTIUM Fr.

168. **Helotium citrinum** (Hedw.) Pers. Sacc. Syll. Disc., page 224, Phill. Disc., p. 157. On under side of rotting fence rails, Yates, Oct., 1899. The cups are of a lemon-yellow color.

PHIALEA Fr.

169. **Phialea Urticæ** (Pers.) Sacc. *Hymenoscypha*, Phill. Br. Disc., p. 141. Sacc. Syll. Disc., p. 173. This is *Helotium fumosum* E. and E., Proc. Roch. Acad. Sci., vol. I, page 53. On dead stems of *Leonurus cardiaca* L. and *Arctium Lappa* L., occupying smoke-colored areas. Lyndonville.

170. **Phialea fructigena** (Bull.) Gill. Phill. Br. Disc., p. 135. Sacc. Syll. Disc., p. 265. In the cups of some oak. Ridgeway, Sept. 29th, 1891.

PSEUDOHELOTIUM Fuckel.

171. **Pseudohelotium Fairmani** (E. and E.) Sacc. Journal of Mycol., vol. IV., page 56. Sacc. Syll. Disc., p. 302. Proc. Roch. Acad. of Science, vol. I, page 52. On under surface of bark lying on the ground. Ridgeway, April, 1888, and Sept., 1899.

PEZICULA Tul.

172. **Pezicula rhabarbarina** (Berk.) Tul. *Patellaria* in Peck, 22 Rep., page 96. *Dermatea* in Phill. Br. Disc., page 343. Sacc. Syll. Disc., p. 311. On dead blackberry stems, Ridgeway, June, 1889. Rhubarb-colored, hence *rhabarbarina* from Rhabarbarum.

CHLOROSPLENIUM Fr.

173. **Chlorosplenium æruginosum** (Oeder) De Not. Peck, 24th Rep., p. 95 (*Peziza*). Phill. Disc., p. 147. The wood on which the plant grows is stained a deep verdigris-green color and is called in Germany "grünfaule," and in England "green oak." It is used in the manufacture of Tunbridge ware. This ware is made in Tunbridge, a town in Kent, England, of hard woods (cherry, beech, holly, etc.), inlaid and wrought into work-baskets, boxes, toys, etc. Our specimens were found on moist, fallen branches of hemlock, in swamps, May, 1895. The author has a block of cherry wood inlaid with a piece of the green wood from this specimen and finds that it takes a good polish, and concludes that the "green oak," as met with in this country, is also suitable for the manufacture of small articles of woodwork, similar to Tunbridge ware. The green coloring matter of *Chlorosplenium æruginosum*, or wood stained by it, is due principally to xylochloric acid. It can be obtained by extracting the green wood with chloroform, is slightly fluorescent, and according to Prillieux its spectrum shows three absorption bands, an intense one in the red, a less intense one in the orange, and one which occupies all of the

yellow. The pigment is not soluble in water, ether, benzine or alcohol. A second coloring matter, xylindein, has been isolated by Rommier. I have made some experiments with xylochloric acid as a stain for microscopic sections and find it unsatisfactory, the staining not being clear, uniform or well differentiated.

MOLLISIA Fr.

174. **Mollisia cinerea** (Batsch) Karst. *Pez.* in Peck, 28th Rep., p. 66. Sacc. Syll. Disc., p. 336. On dead limbs lying on the ground. March, 1898.

PYRENOPEZIZA Fuckel.

175. **Pyrenopeziza Tamaricis** (Roum.) Sacc. Sacc. Syll. Disc., page 371. On dead branches of *Tamarix Africana*, African Tamarisk, at Spring-brook Farm, the residence of Hon. M. L. Parker, Yates, N. Y. April, 1895. New to the State.

TAPESIA Pers.

176. **Tapesia sanguinea** (Pers.) Fuckel. Peck, 33rd Rep., p. 31. Sacc. Syll. Disc., page 371. Phill. Br. Disc., p. 281. On fallen branches. Woods. Lyndonville. May, 1887. The base of the fungus surrounded by a blood-red tomentum, and the wood on which it grows stained red. The red pigment is due to xylerethrinic acid (Bachmann), and is soluble in ether, alcohol, chloroform, etc., and does not afford a very characteristic spectrum.

177. **Tapesia Rosae** (Pers.) Fuckel. Peck, 43 Rep., p. 33. Sacc. Syll. Disc., p. 374. Phill., l. c., page 279. On stems of some wild rose. Yates.

178. **Tapesia Rhois** n. sp. Subiculum dark brown, broadly effused, felted, indeterminate; threads of the subiculum 3-4 μ long, unbranched, without conidia, brownish; cups scattered or gregarious, 1 to 2 millimeters broad, cup-shaped, then expanded and irregular; disc dull black to dark-slate color, with a silver-white margin; asci oblong clavate, 50 to 60 μ in length; sporidia hyaline, continuous, oblong, straight or curved, 7-13 x 2-3 μ. On fallen branches of Sumac, *Rhus glabra* L., Ridgeway, N. Y. May, 1895. The hymenium is occasionally pitted. This can be separated from pale varieties of *Tapesia fusca* by its simple, continuous sporidia, which are not guttulate, nor pseudo-septate, even when viewed with high powers (Bausch & Lomb 1-12). It is possible that the tapesium is formed of the altered substance of the inner bark,

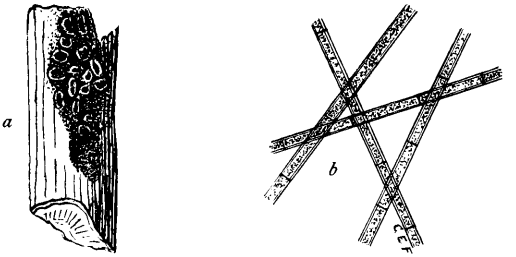

Fig. 1. *a*, Portion of branch with *Tapesia rhois*.
b, Threads of the subiculum.

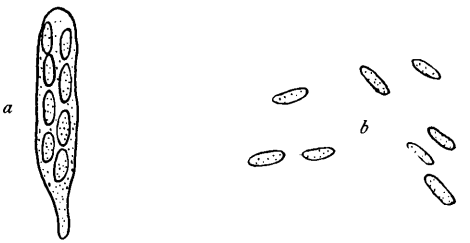

Fig. 2. *a*, Ascus; *b*, Sporidia.
Drawn with Gundlach ¼ in. obj.

Fig. 3. Sporidia more highly magnified.
Drawn with Bausch & Lomb 1-12 in. homogeneous immersion obj.

TRICHOPEZIZA Fuckel.

179. **Trichopeziza albo-lutea** (Pers.) Sacc. *Lachnella*, Phill., loc. cit., p. 259. Sacc. Syll. Disc., p. 412. On boards by the roadside. Yates. March, 1888.

DASYSCYPHA Fr.

180. **Dasyscypha virginea** (Batsch) Fuckel. *Pez.*, Peck, 23 Rep., page 62. *Lachnella*, Phill., l. c., p. 248. On rotting sticks and logs. Common.

181. **Dasyscypha nivea** (Hedw.) Sacc. *Pez.*, Peck, 25 Rep., p. 99. *Lachnella*, Phill., l. c., p. 245. On under surface of a board lying on the ground. Lyndonville, April, 1889.

182. **Dasyscypha fusco-sanguinea** Rehm. Sacc. Syll. Disc., page 459. On rotten wood. May 27th, 1890. Exterior brick-red when fresh.

183. **Dasyscypha clandestina** (Bull.) Fuckel. *Pez.*, Peck, 28th Rep., page 66. Sacc. Syll. Disc., page 457. On dead branches of *Ailanthus glandulosa* Desf. Our specimens are immature. Peck found it on dead stems of *Rubus strigosus*.

Section PHRAGMOSPORÆ.

ARACHNOPEZIZA Fuckel.

184. **Arachnopeziza Aurelia** (Pers.) Fuckel. *Pez.*, Peck, 34th Rep., p. 51. *Tapesia*, Phill., loc. cit., p .280. *Belonidium*, Sacc. Syll. Disc., page 499. On sticks under leaves, in the woods. Yates, May, 1889. On chips, dirt and burs of *Fagus Americana* Sweet. May, 1890. One of our most beautiful species. May be described as a phragmosporous Tapesia. The sporidia in our specimen were 18-20 x 6-8 μ.

Family ASCOBOLEÆ.

Section PHÆOSPORÆ.

ASCOBOLUS Pers.

185. **Ascobolus furfuraceus** Pers. Peck, 29th Rep., p. 56; specimen sent from Buffalo by Clinton. Phill. Br. Disc., p. 290. Sacc. Syll. Disc., p. 516. On cow dung in pastures. Yates, June, 1889.

Section HYALOSPORÆ.

LASIOBOLUS Sacc.

186. **Lasiobulus equinus** (Müll.) Karst. *Ascobolus pilosus* r. in Peck, 27th Rep., page 107. *Ascophanus* in Phill., l. c., . 312. Sacc. l. c., p. 536. On cow dung in pastures, Lyndonville, ıne, 1889.

Family DERMATEÆ.

URNULA Fr.

187. **Urnula Craterium** (Schw.) Fr. Peck, 22nd Rep., . 96. Sacc., loc. cit., p. 548. Woods. Somerset, Niagara Co., [. Y.

CENANGIUM Fr.

188. **Cenangium rubiginellum** Sacc. Sacc., loc. cit., page 60. On dead limbs of *Ostrya Virginiana* (Mill.) Willd. Iron-ood. Lyndonville, June, 1890.

189. **Cenangium populneum** (Pers.) Rehm. *Dermatea ıscicularis* in Peck, 22 Rep., p. 96. *Encœlia fascicularis*, Phill., ɔc. cit., page 336. Sacc. Syll. Disc., page 565. On dead limbs of *Populus sp.* Yates, April 28th, 1890.

190. **Cenangium Ellisii** Sacc. Sacc. Syll. Disc., p. 566. On ead limbs of *Benzoin Benzoin* (L.) Coulter.

TYMPANIS Tode.

191. **Tympanis Fraxini** (Schw.) Fr. Peck, 27th Rep., . 108. Phill., l. c., page 355. Sacc. l. c., p. 581. On fallen ranches of *Fraxinus*.

Family STICTEÆ.

PROPOLIS Fr.

192. **Propolis faginea** (Schrad.) Karst. *Stictis versicolor* Fr. ı Peck, 29th Rep., page 56, where it is reported as sent from Buffalo y Clinton. *Propolis versicolor* in Phill., loc. cit., page 376. Sacc. yll. Disc., page 648. Common on decorticated branches in the oods.

STICTIS Persoon.

193. **Stictis radiata** (Linn.) Pers. Peck, 25th Rep., p. 99. acc., loc. cit., page 682. *Schmitzomia* in Phillips, Br. Disc., page 30.

194. **Stictis stereicola** B. & C. Sacc., l. c., p. 695. On ıme *Stereum*, Ridgeway, July, 1890.

SCHIZOXYLON Pers.

195. **Schizoxylon æruginosum** Fuckel. Sacc. Syll. Disc., page 700. On fallen branches of oak, along the Ridge Road at Oak Orchard, April, 1890. On decorticated maple limbs, Yates, May, 1895.

Family PATELLARIEÆ.

LECANIDION Rab.

196. **Lecanidion atratum** (Hedw.) Rab. Peck, 31st Rep., page 51. Sacc. Syll. Disc., page 795. *Mollisia* in Phill. Br. Disc., page 181. On dead stems of raspberry, Lyndonville, June, 1889. On exposed roots of cherry, Rigdeway, May, 1895. Karsten found it on *Spiræa*. Ellis has almost always found it on herbaceous stems.

197. **Lecanidion indigoticum** (C. & P.) Sacc. *Patellaria* in Peck, 25th Rep., p. 98. Sacc., l. c., p. 797. On fallen branches, Oct., 1888. Easily recognized by the blue color of the crushed hymenium.

BLYTRIDIUM DeNot.

198. **Blytridium fenestratum** (C. & P.) Sacc. *Patellaria* in Peck, 28 Rep., p. 68. On bark of trees, Ridgeway, May, 1888.

Family GYMNOASCACEÆ.

EXOASCUS Fuckel.

199. **Exoascus deformans** (Berk.) Fuckel. Sacc., l. c., p. 816. See also Leaf Curl and Plum Pockets, by George F. Atkinson, Bulletin 73, Cornell Univ. Agric. Exp. Station, Sept., 1894. Causes the disease of the Peach known as Leaf-curl.

APRIL 14, 1896.

The President in the chair. Forty-two persons present.

The President was empowered to appoint some member to prepare a memorial of DR. S. A. ELLIS.

The following paper was read :

THE CLIMATOLOGY OF ROCHESTER.

By Orin Parker.

CONTENTS:

ROCHESTER RECORDS.

By climate we mean principally the conditions with reference to temperature, precipitation, cloudiness, sunshine and wind velocity and direction. Of temperature we have full records as to the highest and lowest for each day, and partial records as to the hourly distribution for twenty-five years; as to precipitation, the record is complete for observations and days and months, but it is incomplete as to hours; the record for the wind is complete as to velocity; partially as to direction, but embraces such a multitude of details it is very hard to handle. The record of cloudiness is complete in a manner and the sunshine depends, of course, in a measure on the cloudiness. The sunshine is greater than the complement of the cloudiness because at times the sun shines through thin clouds.

TEMPERATURE.

As to temperature, it may be said in a general way that this section enjoys moderation. Winters are milder and summers cooler than at some other places on the same latitude. The average annual temperature line is not deflected much by reason of the peculiar situation of Rochester, but warmth is delayed in the spring and lasts longer in the autumn than at places not under the influence and protected so fully by the lakes.

Averages; Comparison.

Taking Omaha for comparison, the yearly mean is 50° against 47° at Rochester; we find for March a normal of 30° at Rochester against 35° at Omaha; 43° for April, against 51° at Omaha; 56° for May, against 62° at Omaha. The delay in the autumn is shown by an average of 41° for November at Rochester, against 37° at Omaha; 29° for December, against 27° at Omaha.

Comparing temperatures of this place with places on nearly the same latitude east and west, with some departures on account of the interest attaching to special stations, we find as follows :

	Highest record.	Lowest record.	Highest monthly normal.	Lowest monthly normal.	Range, or amplitude.	Yearly mean.
Boston,	102	−13	72	27	45	49
New York,	100	− 6	74	31	43	52
Rochester,	99	−12	70	24	46	47
Buffalo,	94	−14	69	24	45	46
Chicago,	100	−23	72	24	48	49
Omaha,	105	−32	76	19	57	50
Los Angeles,	108	+28	72	53	19	52
San Francisco,	99	+29	61	50	11	57
Portland, Ore.,	99	+ 2	67	38	29	53
St. Vincent,	103	−54	66	6	72	34

In a report issued by the Weather Bureau in 1891 the highest temperature is given as 121°, at Yuma on September 8, 1886, and the lowest as −55°, at Havre on March 2, 1887.

Considering the temperatures at Rochester, without comparison, we find the maximum or highest day temperatures to average 56° for twenty-five years. The average is 51° for spring, 78° for summer, 60° for autumn and 33° for winter. The highest average for any ten days is 87° for the ten days ending September 16, 1892, and the lowest 12° for the ten days ending February 13, 1875. The highest average for thirty days is 83° for the thirty days ending August 17, 1892, and the lowest 20° for the thirty days ending February 23, 1895. The highest for any day was 99° on July 20, 1894, and the lowest maximum or coldest day, as distinguished from the night temperature or the average for the day and night, was 2° below zero on February 11, 1893.

The average of minimum or lowest night temperatures is 39° for the year, 35° for the spring, 59° for the summer, 44° for the autumn and 19° for the winter. The highest average for any ten nights is 68° for the ten nights ending July 18, 1876, and the lowest −4° for the ten nights ending February 13, 1875; the 30 warmest nights 66° ended July 28, 1887, and the coldest 30 nights 3° ended February 23, 1885. The highest daily minimum or warmest night occurred July 18, 1878, 76°, and the coldest had a record of −12° January 30, 1873, and February 13, 1875. The average yearly temperature, as given heretofore, is 47°; the mean temperature for the spring is 39°, at Omaha it is 41°; the mean temperature for the

summer is 67°, at Omaha it is 74° ; for the autumn it is 56°, at Omaha it is 52° ; for the winter it is 27°, at Omaha it is 24°.

As showing the mildness and lack of change at some places it may be stated in this connection that the spring averages 60° at Los Angeles, the summer 70°, the autumn 65°, and the winter 55° ; and as a marked example of severity of temperature and temperature changes St. Vincent with spring 35°, summer 63°, autumn 38°, winter zero. And so we might go on citing figures to show that Rochester comes in with severity in no direction as compared with other places, with summers that are cool, but not cold, and winters that are cold without severity. It may be of interest to look somewhat into the causes that govern these conditions. The modifying influence is found in Lake Ontario, principally, which takes in the heat of the sun in summer and gives it out again in winter, thus serving as a balance to keep conditions moving at all times in a groove not so far removed from the normal.

Heat Storage of Lake Ontario.

Lake Ontario is said to contain about 636 cubic miles of water, and the following calculation is based on this quantity. It is doubtful whether it can serve any useful purpose beyond exhibiting the massive grandeur of some of the forces in nature, for the figures are of such huge dimensions it is difficult to convey any definite idea of their magnitude. Let it be supposed that this body of water is reduced in temperature throughout 5° (the change may be much greater) and we find by calculation that the cooling of the waters would give forth as much heat as the burning of about 2,500,000,000 tons of coal ; or about five times the quantity mined yearly in the world. This heat, of course, is taken from the amount received from the sun during the summer and part of the spring and fall, and given out again during the cold season, when it is most needed.

For all the lakes the quantity of heat given off during the cold season probably exceeds that which would be derived from the burning of over 30,000,000,000 tons of coal. These aggregates, large as they are, are not sufficient, however, to entirely reverse the vast influence operating to produce heat and cold over this portion of the earth's surface. The provision is simply enough to prevent extremes of heat in summer and greater severity of cold in winter. As an example of this modifying influence, attention may be called to Omaha, with highest temperature of 105° and lowest of −32°, against 99° and

−12° for Rochester; and St. Vincent, which is, however, somewhat further north, with a maximum of 103° and a minimum of −54°. The Atlantic ocean is also near enough to occasionally modify to some extent both winter and summer temperatures.

Warm Waves.

As a rule warm spells are of home manufacture, meaning by this that they are generated over the interior of this country and not imported from beyond its borders. The conditions for their production are a quiescent state of the lower air, one in which there is no movement to mix the lower with the upper masses. They appear on the western face of a high pressure where the tendency of the force of the prevailing pressure is to bring the lower winds up from the South, and are usually located in the eastern half of a large and nearly forceless low whose center is somewhere over the West and moving slowly. Given these conditions and the production of warmth is certain at some place in the debatable land between the high and the low. One such warm spell at Rochester was the direct result of a cold wave that came in over the Northeast and held the lower air almost absolutely quiescent under its southwest quadrant, much as if the air were anchored in position. The heat of the sun was sufficient to heat up a thin layer near the ground to a high temperature in the course of about three days. Usually warm waves originate west of the Mississippi in the country where the rays of the sun reach the earth without being interfered with by cloudiness and gradually drift eastward frequently gaining while journeying.

Cold Waves.

With cold waves the facts are entirely different. No cold wave ever originates over this section. They are all importations. At long intervals cold appears to be originated over the Western plains, generally in Wyoming on the eastern slope of the Rocky mountains, but these spells are always of minor importance and seldom reach the dignity of what would be called real cold. Cold waves of importance appear to all originate in that portion of the continent north of the United States and east of the northern range of mountains. Their generation is conceived to proceed from the slow accumulation of a body of dry air over the region mentioned wherein the temperature is lowered principally by radiation from the surface of the earth. That portion of the country is covered with ice and snow during the winter and radiation proceeds uninterruptedly. The air is dry because its moisture is removed in passing over the mountains to the westward by

the cold of elevation. The air comes in from the West from the general drift of the atmosphere from the west to the east up to about the 65th parallel.

When the cold wave is well formed the requirement for its transfer to the lower latitudes in force is to have a storm of energy form and pass to the east well south along the southern front of the mass of cold air. The road is then open and forces well disposed for its coming with speed and energy. Sometimes the storm does not respond to the necessities of the hour, in which case the north keeps its own until different dispositions of forces or the advance of the sun have time to mix up or destroy the severity. About the first of last January such a cold wave was met on the northern border of the United States by a powerful tendency toward warm which held it at bay for days and finally prevailed against it so that it never reached farther south. It was a huge affair with pressure above 31 inches and temperatures more than 50 degrees below zero.

Effect of the Lakes.

It is in the meeting of these cold waves that the lakes, with their vast stores of heat, become so important. Always in the early winter, and generally at all seasons, these cold waves split on the lakes, one detachment passing to the north and the other down over the west. The western detachment has so far to travel and is subjected to the influence of so much country relatively warm that even if forces operate exactly right for it to go south, only far enough to clear the lakes, and then northeast over this section, it does not get here with severity. The northern detachment is far more dangerous because its journey to the eastward north of the lakes is shorter and over a country so much colder; the severest cold that reaches this section is from these northern detachments, but in this case even it requires a particular operation of forces not likely to work out very frequently. The cold can come in a tortuous course down over the Michigan peninsula, and across the Niagara strip without crossing much water. Severity has reached us by that route. The other combination is for the cold to forge eastward far enough to clear Lake Ontario, then move south to a point directly east, thence be pushed back over this section. This requires two changes of direction at about the right time, and is improbable in any particular case, but has worked out successfully. The cold of January 6, 1896, 10 degrees below zero, and the lowest of the winter, came in this way.

The lake stands always, so long as unfrozen, as a complete barrier

to the coming of severity from directly north or northwest. A more correct statement would, perhaps, be that it stands a complete barrier to the utmost severity being felt here, for the cold may pass overhead and strike further south. This is so, and must be so, because so long as the water is unfrozen the air in contact with it must take the temperature of the water, which cannot be much below 32 degrees, and this will heat up the lower layer which is felt here while the great cold may be passing over higher up. In such a movement the surface air must necessarily be from north to south, which brings the air of the lake surface directly on us.

PRECIPITATION.

As to precipitation, it may be said in a general way that, as with the temperatures, moderation prevails here. This place is not distinguished with high or low annual, monthly, seasonal or daily precipitation. The only place it reaches high rank in this connection is in the number of days rain or snow falls. Here it comes near the apex of experience in the United States. It takes somewhat high rank in the even distribution of precipitation through the months and seasons. No complete comparison of the departures from year to year can be given, but it is less here than most places. The average annual rainfall is about 34 inches against an average of 36 inches for the entire country. A sufficiently close comparison of seasonal with the average of the whole country is given elsewhere. The frequency of days with one-hundredth of an inch or more is supposed to be somewhat greater at Oswego than here; outside of that one place Rochester holds the banner position. This frequency comes, however, largely from the fall of unimportant light lake snows during the winter.

The probability of rainy days ranges from 65 out of the hundred in January to 32 in August, against 41 in January to 33 in September at Boston and San Francisco; 65 in January to 13 in August at Portland, Ore. In evenness our record is superb in both number of days and amounts per month and season. In normal for months the record here is from 3.34 inches in May to 2.44 in September, against 4.60 in November to 3 in September at Boston; 4.80 in August to 3 in May at New York; 3.80 in October to 2.40 in April at Buffalo; 3.70 in July to 2.20 in December at Chicago; 5.70 in July to 0.70 in February at Omaha; 4.00 in February to trace in July at Los Angeles; 5.30 in December to trace in July and August at San Francisco; 8.00 in December to 0.60 in July and August at Portland; 3.70 in July to 0.60 in January, February and November at St. Vincent; 14.40 in

December to 2.10 in July at Tatoosh, Wash., and 0.60 in February and December to trace in May and January at Yuma, Arizona.

It will be observed that the range is less than at any other place except Yuma, where the greatest for any month is too small to permit of so much. Tatoosh and Yuma represent the highest and lowest rainfalls in so far as reported by the Weather Bureau. The average annual rainfall at Tatoosh is 89 inches while it is a little over 3 at Yuma. In a publication in regard to precipitation issued by the Weather Bureau, dated April 30, 1894, it is said that, it is a matter of interest to ascertain whether the rainfall at any particular place is due largely to small rains, or to great ones. If the former is the case it will generally be favorable to agricultural operations and lessen the injury from floods.

In order to ascertain the character of the rainfall tables have been prepared giving the percentage of days on which there was no rainfall, those on which the rainfall was between a trace and 0.25 inch, 0.25 and 0.50, 0.50 to 1.00, 1 to 2, 2 to 3, 3 to 5, and over 5 inches. These are all expressed in percentage of days on which such rain fell, and the months have been equalized so that the percentages show the relative times of rainfall, and also, with proper treatment, the relative quantity of rainfall of each kind. Examining this series we find four very distinct types as to the relative frequency of light and heavy rains. The first type is that which is found on the Lower Lakes, and which has its extreme at Oswego. Its especial characteristic is the relatively large number of days on which small rains fell. This number of days is often greater than those on which no rain fell. This is particularly the case with these rains in the winter, but it may extend in some cases through the year and at Oswego it is found that this maximum appears clearly in the annual rainfall curve.

It would be interesting to decide how much rainfall in a single day is damaging and how much beneficial. Undoubtedly the small rains, generally speaking, are beneficial and the heavy rains damaging. In frequency of small rains it will do no harm to read Rochester for Oswego. The greatest daily rainfall occurred in August, 1893, on the 19th, 4.19 inches. This is low compared with the extremes for many other places as, for instance, Alexandria, La., on June 15th and 16th, 1886, when over 21 inches fell. Helena, Ark., reports 12 inches in 40 hours; Hatteras, N. C., 9 inches in one day; New Orleans, 9; Fort Wallace, Kan., 9; Mayport, Fla., 14, and many other places nearly as much. In snowfall Rochester occupies a medium place, with about ten feet per year. There are much greater falls in north-

ern New York along the lower St. Lawrence and sometimes at Buffalo, and always over the upper lakes, particularly south of Lake Superior. To return to rainfall, including snowfall melted as a part part thereof, an examination of the records shows that the greatest average rainfall occurs during the ten days ending June 28th, during which 1.23 inches is the normal. The ten days ending June 8th is a close second, with 1.22, and also January 14th, with 1.21. The least rainfall occurs with 0.63 during the ten days ending August 7th, with 0.73 during the ten days ending February 4th as a close second.

The greatest rainfall for any ten days is 6.40 ending October 26th, 1873, and there have been eight instances of ten days passing without any fall whatever during the last 25 years. By 30-day periods the greatest average is the 30 days ending June 8th, in which 3.39 inches falls, and the least during the 30 days ending October 16th, in which the average is 2.35, showing a range in 30-day averages of only 1.04 inches.

The greatest rainfall for 30 days was in the 30 days ending November 15th, 1873, 9.20 inches; the least, 0.20, November 15th, 1874. In percentage of days on which 0.01 or more precipitation occurs, the normal daily record varies from 67, January 18th, to 33, September 1st. The greatest 30-day record is 90 per cent., February 3, 1874, and the least 7 per cent., September 6, 1876. As to the distribution of rainfall through the year, 24 per cent. of the annual rainfall comes to Rochester during the spring, 26 per cent. during the summer, 24 per cent. during the autumn and 26 per cent. during the winter. At Boston the same record is 24, 24, 25, 27; New York, 24, 28, 24, 24; Buffalo, 21, 26, 28, 25; Chicago, 26, 30, 25, 10; Omaha, 28, 43, 26, 6; Los Angeles, 21, 2, 13, 64; San Francisco, 25, 0, 17, 58; Portland, 24, 6, 24, 46; St. Vincent, 20, 45, 23, 12. Rochester shows a variation of only 2 per cent. for the seasons, against 3 at Boston, 4 at New York, 7 at Buffalo, 11 at Chicago, 37 at Omaha, 62 at Los Angeles, 58 at San Francisco, 40 at Portland and 33 at St. Vincent.

An interesting point in this connection is the average rainfall for the entire United States. The average of all stations by states gives for spring about 9 inches, Rochester has 9; summer, 10, Rochester, 9; autumn, 8, Rochester, 8; winter, 9, Rochester 9; total yearly, 36 inches; Rochester, 34. It appears that the rainfall over the United States generally is quite evenly distributed through the year, varying in total amount for the seasons from 10 inches for summer to 8 inches for autumn. The variation at Rochester is even less than this, being

only from 9 to 8. Generally the spring and summer rainfalls are the highest ; other things being equal, the rainfalls of spring and, next to that, of summer are the most useful for agricultural operations. At Rochester this statement becomes absolute.

With the depth given it is not difficult to get the average total rainfall for the entire United States, excluding Alaska. For this purpose we may take the average for each state and multiply it by the area of the state including water surfaces. Adding these together we get 1,407 cubic miles as the average annual total of water which descends as rain or snow in the United States. The annual depth of rainfall thus calculated is 29 inches, or less than that given by the other method. This is to be expected since the other method gave equal weight to each political division and these divisions are generally smaller in the regions of greater rainfall.

To get some conception of this enormous mass of water we may compare it with the contents of the great lakes and an approximate comparison is near enough. Lake Ontario contains about 636 cubic miles of water. The annual rainfall would fill it two times and leave something over for a third time.

Source of Moisture.

It is probable that the greatest source of water vapor supply for this section is the Gulf of Mexico, notwithstanding its great distance ; next in importance the Atlantic ocean, and lastly the lakes. The evaporation from the land is very largely carried out of the country by the easterly movement of the atmosphere during spells of dry weather. Large bodies of water produce vapor in great quantities continually and are producing as rapidly at the end of a dry spell when the land is pretty well exhausted. The machinery for bringing the vapor in from the oceans is found in the great storms which continually cross the country from west to east. In the eastern half of every storm the wind is from the south to the north and if the storm happens to be sufficiently large to reach well down over the Gulf, vast volumes of vapor are engaged and brought north to be precipitated over the country, sometimes far north of the border.

Coming from the Gulf of Mexico, the moisture-laden air is compelled to ascend to a much greater elevation and is exposed to mixture with bodies of cold air encountered in the journey and to loss of heat by radiation from the tops of clouds after they are formed. When a storm center passes south of this section masses of vapor from over the Atlantic are engaged in the northerly and westerly movement of

the eastern and northern quadrants of the storm, are brought inland, and are easily precipitated by elevation, radiation and mixture with cold air found over the lakes and along the borders. This is the mechanics of every heavy snowstorm whose history has been examined at this place.

CLOUDINESS.

In cloudiness, Rochester easily holds the lead, so far as records are available. It is great in amount and remarkably evenly distributed through the year. It is greatest in December with a normal of 83 per cent., and least in August with an average of 44 per cent., and the average for the year is 61 per cent. Compared with some other places, we find the same figures to be at Boston, 56 per cent. in December, 45 per cent. in August, and 51 per cent. for the year; Yankton, S. D., 51 per cent. in March, 39 in September, and 45 per cent.; San Francisco, 48 per cent. in January, 32 per cent. in October, and 42 per cent.; Portland, Ore., 72 per cent. in January, 35 per cent. in August, and 59 per cent. For the spring: at Rochester, the cloudiness is 58 per cent.; Boston, 54 per cent.; Yankton, 52 per cent.; San Francisco, 43 per cent.; Portland, 64 per cent. The summer: Rochester, 46 per cent.; Boston, 46 per cent.; Yankton, 42 per cent.; San Francisco, 43 per cent.; Portland, 64 per cent. Autumn: Rochester, 62 per cent.; Boston, 51 per cent.; Yankton, 41 per cent.; San Francisco, 35 per cent.; Portland, 55 per cent. Winter: Rochester, 78 per cent.; Boston, 53 per cent.; Yankton, 47 per cent.; San Francisco, 47 per cent., Portland, 72 per cent. Allowing 10 per cent. for sunshine through thin clouds and adding the complement of the cloudiness sunshine is 49 per cent. of the possible at Rochester, 59 per cent. at Boston, 65 per cent. at Yankton, 68 per cent. at San Francisco and 51 per cent. at Portland. Once during the past twenty-five years the cloudiness has been 100 per cent. for ten days, once 98 per cent., twice 96 per cent. and eleven times above 90 per cent., all except three occurring during the winter decades. The greatest for 30 days is 91 per cent. ending February 3, 1886, and the least 28 per cent. ending October 6, 1891.

WINDS.

In wind velocities Rochester is believed to hold about an average position. The most marked feature is found in the absence of tornadoes and very severe storms.

Remarks were made in discussion of the paper by Emil Kuichling, Professor A. L. Baker, J. E. Putnam, the President, and the author.

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; *Pellæa 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.

*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 University, 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.	Winter.	Absolute Extremes. 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.

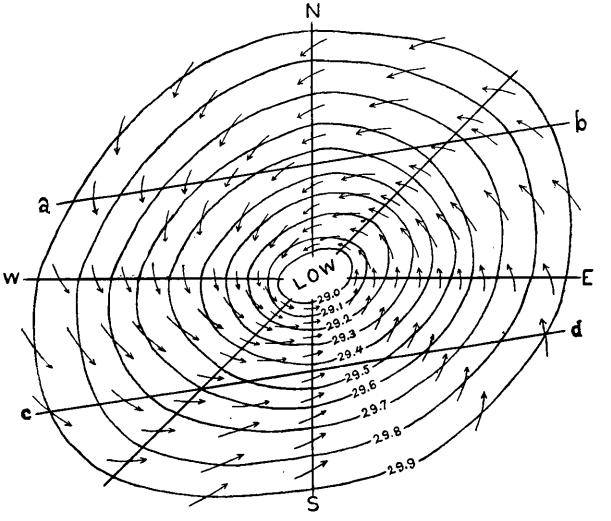


FIG. 1. Diagram showing the theoretical wind directions within the cyclone. The arrows fly with the winds. The concentric lines are isobars (*isobarometrics*) or lines of equal air pressure, drawn for tenths of inches of the mercury column.

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

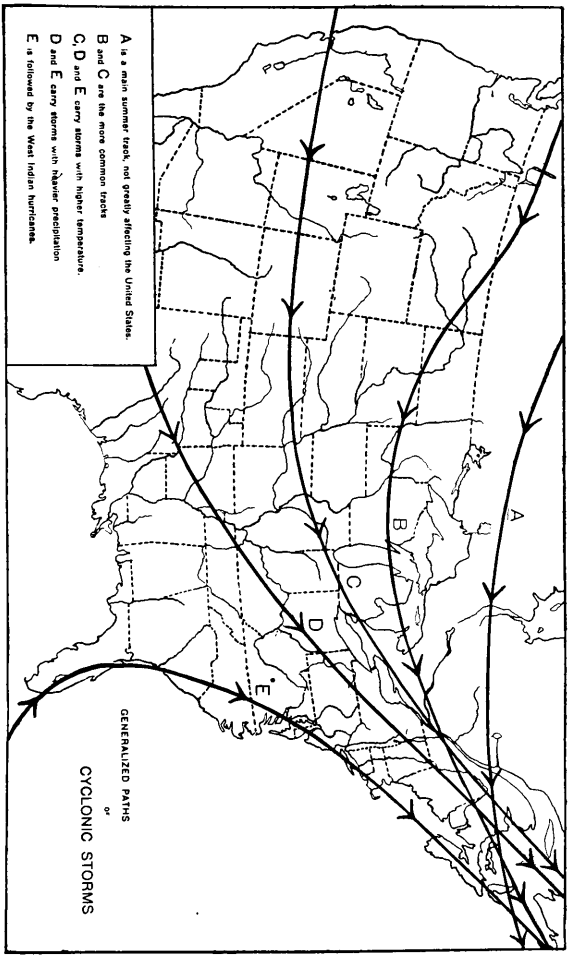


FIG. 2. Map showing the more common tracks of cyclones, and their concentration toward the northeast.

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.

* 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.

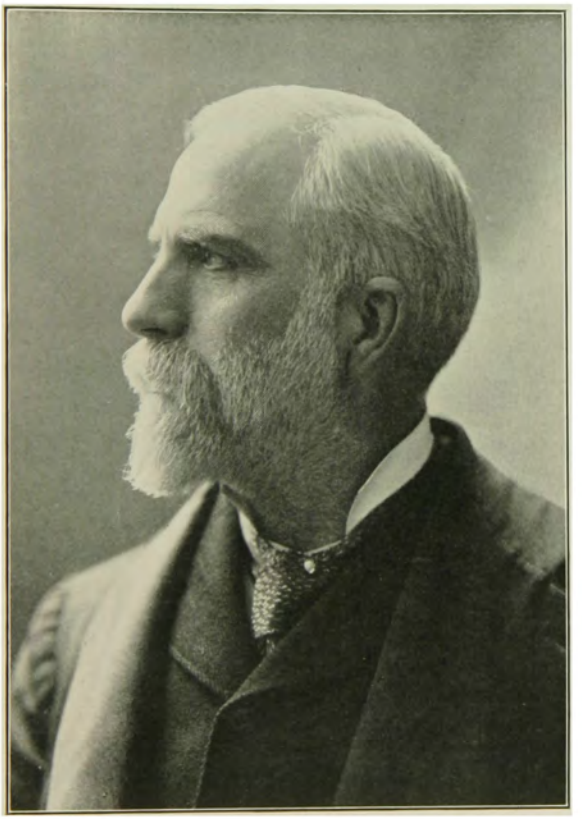
S. A. LATTIMORE.
1879.

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.

President: Herman L. Fairchild, 1889-1901.

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.

Second Vice-President: Abram S. Mann, 1889-1890; J. Eugene Whitney, 1891, 1895-1897; J. Edward Line, 1892; M. L. Mallory, 1893-1894; George W. Goler, 1898; Charles W. Dodge, 1899-1900; Shelly G. Crump, 1901.

Secretary: Albert L. Arey, 1889-1890; Frank C. Baker, 1891-1892; Arthur L. Baker, 1893-1897; Montgomery E. Leary, 1898-1901.

Corresponding Secretary: S. A. Ellis, 1889; George W. Rafter, 1890-1891; Charles W. Dodge, 1892-1901.

Treasurer: E. Ocumpaugh, Jr., 1889; Edwin E. Howell, 1890-

1891 ; J. Eugene Whitney, 1892-1893 ; F. W. Warner, 1894-1897; J. E. Putnam, 1898-1901.

Librarian. Mary E. Macauley, 1889-1893 ; Florence Beckwith, 1894-1900 ; William D. Merrell, 1901.

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.