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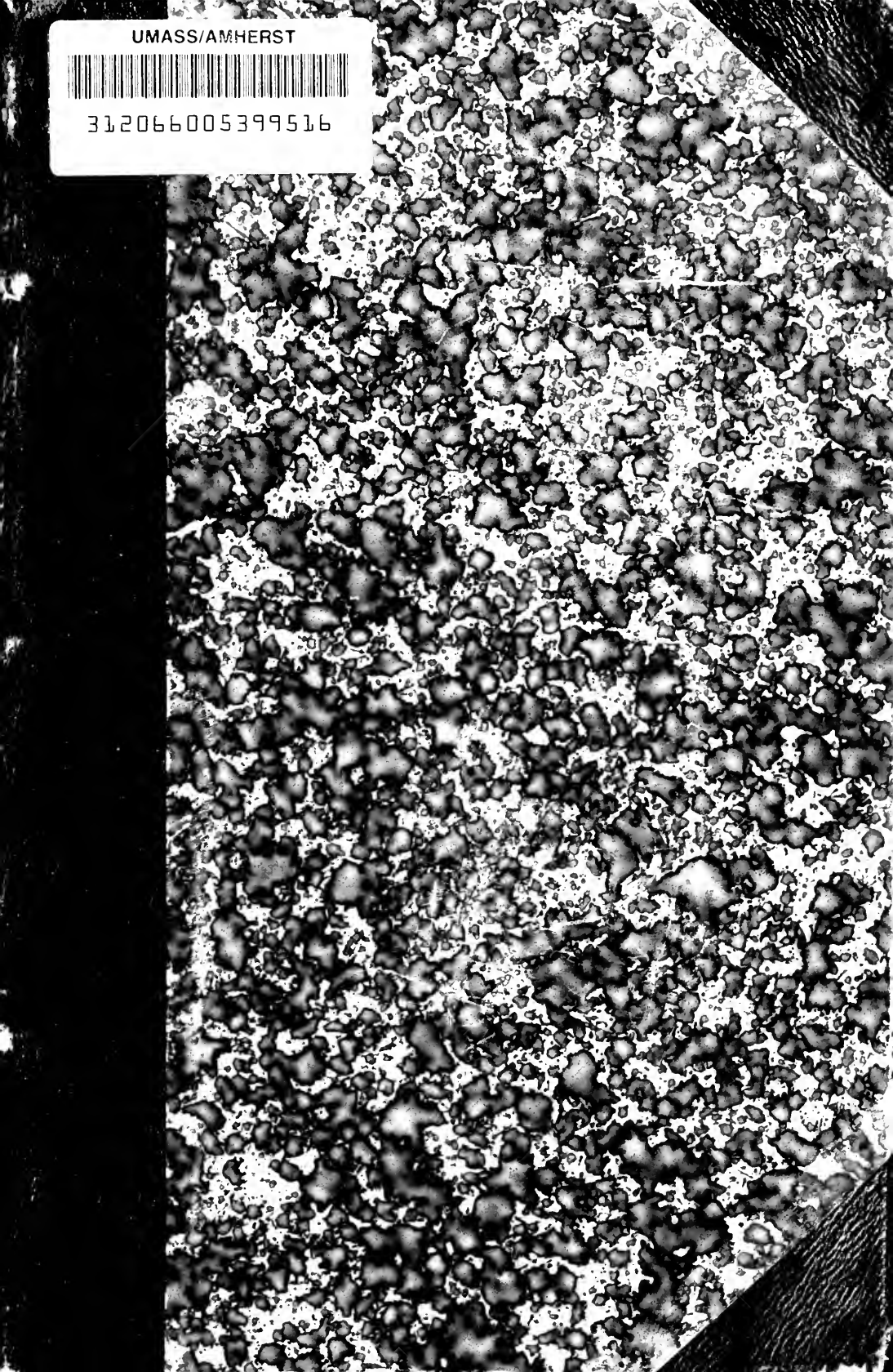

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TRANSACTIONS

OF THE

Massachusetts Horticultural Society,

FOR THE YEAR 1890.

PART I.

BOSTON:
PRINTED FOR THE SOCIETY.
1890.

L32.06
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CHAPEL

The following papers and discussions have been circulated to some extent in the form of slips reprinted from the reports made by the Secretary of the Society in the Boston Transcript. As here presented, the papers are printed in full, and the discussions are not only much fuller than in the weekly reports, but, where it appeared necessary, have been carefully revised by the speakers.

The Committee on Publication and Discussion take this opportunity to repeat what they have before stated, that the Society is not to be held responsible for the certainty of the statements, the correctness of the opinions, or the accuracy of the nomenclature in the papers and discussions now or heretofore published, all of which must rest on the credit or judgment of the respective writers or speakers, the Society undertaking only to present these papers and discussions, or the substance of them, correctly.

O. B. Hadwen,
William H. Hunt,
Francis H. Appleton,
Committee on Publication and Discussion.

TRANSACTIONS

OF THE

Massachusetts Horticultural Society.

BUSINESS MEETING.

SATURDAY January 4, 1890.

A duly notified stated meeting of the Society was holden at half past eleven o'clock. The chair was taken by the President, DR. HENRY P. WALCOTT.

President Walcott, after thanking the Society for the kindness always shown him and the hearty support given him during the four years in which he had presided over the Society, introduced the President elect, WILLIAM H. SPOONER, who delivered the following inaugural address.

ADDRESS OF PRESIDENT SPOONER.

Ladies and Gentlemen:— As we meet together today at the commencement of a new year, united in our interest in all that this Society exists to promote, shall we consider briefly at first what the condition of our affairs is, and in what measures lie our best possibilities of advancement? From the excellent reports of our Standing Committees, so far as presented, it appears that the exhibitions of the past year have been, with a few exceptions, up to the usual standard, but it also appears that they have not proved so attractive to the public as could be desired. As this age demands novelty in every department of life, it has occurred to me that the cause of the apparent lack of interest may be in the exhibitions themselves; there is too much sameness in them, and if some special novelties could be introduced into the four principal shows, particularly the Annual one, renewed interest

might be aroused. Ex-President Parkman wisely cautioned us against "getting into ruts and staying there," and we shall do well to keep pushing that we may avoid this error. In corroboration of this idea, we recall the financial success of that exhibition in which Mr. Sturtevant's beautiful collection of Nymphæas was introduced, and the Rose Exhibitions at which Mr. Hayes or Mr. Moore presented unusually beautiful specimens, eliciting substantial marks of public favor; or again, the last Chrysanthemum Show, to which Mr. Simpkins, from the sandy soil of Cape Cod, contributed, through his skilful gardener, blooms that far exceeded any of the kind ever seen in our Hall, raising the standard for future emulation, and leaving our receipts perceptibly enlarged. Do not these facts prove that the lack of interest must arise from lack of attraction in the exhibitions, and will not the intelligence of our committees be able to devise a remedy? While the work of the Society in the future is undoubtedly largely to encourage the improvement of standard collections, there is perhaps a still broader field for progress in stimulating the production of seedlings of hardy flowering plants and fruits, in which latter department we have the example of Mr. Dana, who has left us the well-known pear, which received the Society's commendation, and holds its place among the most desirable varieties.

Messrs. Hovey, Wilder, and Heustis have displayed their skill by giving us new and improved kinds of strawberries, receiving the Society's approval; and in seedling grapes, Mr. Bull, in his famous Concord, has made it possible for every citizen to sit under his own vine and eat of its fruit. Among plants, from the experiments of the Messrs. Hovey and Mr. Parkman, we have had rare improvements in the Lily family; in pinks and carnations by Messrs. Hyde, Tailby, and Fisher; and in chrysanthemums, Dr. Walcott has shown his skill by productions of great merit. I cite these instances of what has been accomplished by effort in the past; and they can probably be exceeded in the future, as inventive genius is continually surprising us on every side with its marvellous developments, and whosoever shall be the scribe of the Society at the end of its next half-century will have wonders to record far beyond our fairest imaginings.

Who is to be the pioneer of seedlings in the Rose department? The opportunity is wide for the production of seedlings of free-blooming varieties which shall be hardy enough to withstand the

difficulties of our changeable climate. We hear that experiments have been made in New York by crossings with *Rosa rugosa*, which is undoubtedly a true basis to work from. Judging from experience, it would seem wise to promote interest in this department by offering liberal prizes.

As another measure conducive to interest in our work, I would suggest that members should be furnished by mail with copies of the programmes for the discussions of the season, and with the Schedule of Prizes, and should be informed that the published TRANSACTIONS of the Society can be obtained by application to the Secretary. Members should also be notified of the quarterly meetings. The Treasurer should give due notice to annual members of their assessment dues, and new members should be furnished with a copy of the Constitution and By-Laws. With the modern facilities for supplying wrappers and superscriptions, the extra expense would not be very large, and the labor need not fall upon the Secretary, to add to his duties. It seems to me that this might prove helpful as a reminder to members of what is going on here.

I regret that the special Committee on Window Gardening has not yet reported, but from the preliminary statement of its Secretary, we can judge that the work has made rapid progress during the past year, and would seem to be worthy of continued support.

During the past year the Society has lost by death several prominent members, one of whom, Aaron D. Weld, of West Roxbury, joined this organization in 1829, the year of its formation. Other valuable members were Henry Weld Fuller, of Roxbury, so long identified with our affairs as Vice President, and at the time of his death a member of the Executive Committee; Charles L. Flint, of Boston, for many years Secretary of the State Board of Agriculture; Henry Shaw of St. Louis, a Corresponding Member, well known as the distinguished philanthropist who gave so large a sum to further the cause of botanical education in St. Louis; and William C. Harding, of Stamford, Conn., formerly a large contributor to our exhibitions, for each of whom suitable memorials have been offered. Two other valuable members have passed from us, James Cartwright of Wellesley, for several years a very efficient member of the Committee on Plants and Flowers, an honest man of most reliable judgment; and James O'Brien of

Jamaica Plain, also a member of the same Committee, well informed in his profession, a good cultivator, and one who would have been of service to the Society had his health permitted.

The finances of the Society are in as prosperous condition as can reasonably be expected after the unusual expenditure forced upon us by the fire in our building about a year ago, which reduced our income from the halls, during the time occupied in repairs. The opportunity was, however, improved for making various needful changes and additions in the Halls and Library Room, which are greatly to our advantage, but which necessitated larger expenditures than was covered by the insurance received. The Halls are much improved, and will undoubtedly be more in demand. The Library Room is especially benefited by the changes made, giving additional space for books, which was one of its needs; the Library Committee now consider it sufficiently commodious for present purposes.

These drafts upon our income have prevented any addition to the Sinking Fund, but we can reasonably hope to add something to this Fund, (which now amounts to about $5,000) during the coming year. The mortgage debt of the Society is $25,000.

The Treasurer's report will show gross receipts for the year of $51,098.31, including a balance on hand January 1, 1889. The total expenditures have been $40,477.75, leaving a balance of $10,620.56; of this $1,000 should be reserved for the John Lewis Russell Fund, making the net balance on hand January 1st, 1890, $9,620.56. There has been received from Mount Auburn Cemetery $4,322, included in the above.

Ladies and Gentlemen: In assuming the duties of the office with which you have honored me, I realize fully its large responsibilities, and my own shortcomings; but, recalling in retrospect the many distinguished men, whose wise counsels have heretofore directed us and aided the growth of our Society, I can only strive in some degree to emulate their zeal, and earnestly hope for your suggestions and support to strengthen my efforts.

John G. Barker, Chairman of the Committee on Gardens, made a report of the awards by that Committee for the year 1889, which was accepted. Mr. Barker asked to be allowed until the first Saturday in February, to prepare the remainder of his report, which was granted.

Mrs. H. L. T. Walcott, Chairman of the Committee on Window Gardening, read the Annual Report of that Committee, which was accepted and referred to the Committee on Publication.

The President, as Chairman of the Executive Committee, reported a recommendation that the Society make the following appropriations for the year 1890:

For Prizes for Plants and Flowers, . .	$3,000	
" " " Fruits, ...	1,700	
" " " Vegetables, . . .	1,000	
" " " Gardens, ...	300	
Total for Prizes, ...		$6,000
For the Library Committee, for the purchase of magazines and newspapers, binding of books and incidental expenses of the Committee, ...		$300
For the Committee on Publication and Discussion, .		250
For the Library Committee, to continue the Card Catalogue of Plates, ...		100
For the Committee of Arrangements, this sum to cover all extraordinary expenses of said Committee, .		300
For the compensation of the Secretary and Librarian and Assistant, ...		1,700
For Prizes for the Promotion of Window Gardening,		150

These appropriations were unanimously voted by the Society.

The President also reported from the Executive Committee the appointment of Robert Manning to be Secretary and Librarian, and W. Wyllys Gannett to be Treasurer and Superintendent of the Building for the year 1890.

On motion of E. H. Hitchings it was voted that, agreeably to the rules of the State Board of Agriculture three prizes of $10, $8, and $6, be given for the best reports of awarding committees, and that the Committee on Publication and Discussion be requested to award these prizes.

On motion of Benjamin G. Smith it was voted that a committee of three be appointed to procure a portrait of the retiring President, Dr. Henry P. Walcott, and Mr. Smith, Francis H. Appleton and Leverett M. Chase, were appointed as that Committee.

Mr. Smith also, as Treasurer of the American Pomological Society, presented to the Library a copy of the Proceedings of that Society at its Twenty-second Session, in Ocala, Florida, February, 1889, for which the thanks of the Society were voted.

A letter from F. Lyford, in regard to a claim on the Society, was read and referred to the Finance Committee.

Ex-President, James F. C. Hyde stated that much dissatisfaction existed among the members of the Society in regard to the appointment of Treasurer made by the Executive Committee, and moved that a committee of five be appointed by the Chair to confer with the Executive Committee on the subject. The motion was unanimously carried, and the Chair appointed as that Committee, Mr. Hyde, Leverett M. Chase, E. W. Wood, Patrick Norton, and John G. Barker.

Hon. Eugene H. Clapp, of Roxbury,

having been recommended by the Executive Committee as a member of the Society, was on ballot duly elected.

O. B. Hadwen, Chairman of the Committee on Publication and Discussion, announced that the first of the meetings for discussion the present season would be held on the next Saturday, at half past eleven o'clock, when Professor G. H. Whitcher, director of the New Hampshire Agricultural Experiment Station, Hanover, N. H., would read a paper on the "Growth and Nutrition of Plants."

Adjourned to Saturday, January 11, at half past eleven o'clock.

BUSINESS MEETING.

Saturday, January 11, 1890.

An adjourned meeting of the Society was holden at half past eleven o'clock, the President, William H. Spooner, in the chair.

The Secretary read a letter from W. W. Dunlop, Secretary of the Montreal Horticultural Society, containing the information that a Convention of Fruit Growers of the Dominion of Canada

would be held in the City of Ottawa, on the 19th, 20th, and 21st of February, and extending a cordial invitation to this Society to send one or more delegates to the meeting. Also that in connection with this Convention, an exhibition of winter fruits would be held, and asking this Society to appoint a competent judge to act with another, to be appointed by the Western New York Horticultural Society, in awarding the prizes. It was voted to accept the invitation of the Montreal Horticultural Society, and O. B. Hadwen was appointed Delegate and Judge.

Adjourned to Saturday, January 18, 1890, at half past eleven o'clock.

MEETING FOR DISCUSSION.

A lecture was expected from Professor G. H. Whitcher, of the New Hampshire Agricultural Experiment Station, on the "Growth and Nutrition of Plants." Professor Whitcher was, however, owing to the delay of a railroad train, not present. In place of that paper there was given an *impromptu* talk, from recent observations in the Golden State, upon the

Horticulture of California.

By Benjamin P. Ware, Clifton, Mass.

Mr. Ware said that, being entirely unprepared to speak, his remarks might be somewhat rambling. The subject is so vast that it would require some time to give a full account of it. Everything connected with California is on a vast scale, and the people express themselves largely, and he did not wonder at it. He began by giving a description of a ranch, as they call a farm in that State. He selected the estate of General John Bidwell, who went to California in 1847, and soon acquired possession of one of the great Spanish grants — probably forty thousand acres. Here he began a town, called Chico, which now has six thousand inhabitants. It is beautifully located and can be thoroughly irrigated. As you enter the estate by a long avenue lined with beautiful trees, you first come to a cherry orchard, where there is one tree five feet through at the base. Next there is an apricot orchard of hundreds of acres, the rows of trees extending as far as one can see. To utilize these fruits, General Bidwell has a

canning factory of his own. There is also a large olive orchard; the cultivation of this fruit and the manufacture of oil is destined to be one of the leading interests of California. A superior variety of prune, known as the French prune, has been introduced, and from the fruit dried prunes of superior quality are manufactured. In the summer the climate is warm and there is no rain or dew, so that prunes and raisins can be dried by the sun alone. There is a large peach orchard, containing the varieties of best quality for canning and transportation. Gen. Bidwell had a large vineyard for wine, but being a prohibitionist he pulled up the vines, and now grows grapes only for raisins. He makes five hundred barrels of cider annually, all of which is made into vinegar.

Mr. Ware saw acres and acres of squashes, or, as they are called there, pumpkins, producing at the rate of twenty tons per acre; they are valued at $2 per ton. There is no frost there, and they are piled up in the fields until wanted for use. He saw a photograph of a field which was said to have produced eighty tons to the acre. The peach, apricot, prune, and fig require only four years to make good, thrifty bearing trees. Almonds and English walnuts thrive there; indeed, all the fruits now imported from Europe find a congenial home in California, and our whole country will undoubtedly before long be supplied from thence with all the fruits and nuts now imported. It is only about twelve years since it was known that the various fruits could be grown in California to advantage. Soon after the discovery of gold, in 1849, oats were found growing there, having stalks six feet high, and it was argued that if oats would grow there wheat would also. Last year a surplus of fifteen millions of bushels of superior wheat was exported. Wheat and barley are grown without irrigation.

Oak trees are found growing naturally in various parts of the State and forming park-like scenery. The principal species are the live oak, water oak and a variety resembling our white oak, but producing timber much inferior to that. The atmosphere is very peculiar; standing thirty miles away from the Sierra Nevada, it looks as if there were a descent to the foot-hills instead of a rise. The lumber interest is a very important one at Chico; a flume thirty-eight miles long has been built to float down the lumber, which travels that distance in four hours and a half, and the same water is afterwards used for irrigation.

Fruit and alfalfa require more or less irrigation in the larger portion of California, but the idea that irrigation must be continuous has been found erroneous; continuous irrigation may be required for alfalfa, but it is not for fruit. The fruit in California is of poor flavor compared with that grown here. The cherry orchards are irrigated when the fruit is about ready to swell off. It has been learned that stirring the surface soil forms a mulch which prevents rapid evaporation and is much better than constant irrigation. After irrigation if the surface is stirred with a cultivator it will be dry for two or three inches and keep moist below that; if it is not stirred a crust forms on the surface and the ground is dry for a foot or more in depth.

General Bidwell has on his ranch a colony of Digger Indians, supposed to be the lowest and meanest of all, but the men are among his best workmen, especially as ploughmen. The women and children he employs in picking fruit, etc., and they look tidy and respectable. Mrs. Bidwell has a Sunday school and a day school among them. But Indians in general who have been sent to schools in various parts of the country are apt to return to savage life, and the better educated die of consumption, caused by confinement which is so contrary to their nature.

General Bidwell's farm comprises 2,200 acres; the dairy products amount to $1,200 per month, and there are six thousand sheep and thousands of cattle and horses. But although all the products are carefully put on the market, the farm is not profitable; it is too large. Such farms must be divided into small holdings and managed by the owners; no one man can conduct such an estate to advantage.

Henry Miller, known as the great cattle king, began in San Francisco as a butcher. He bought Spanish grants and owns about one million acres, which he has divided into ranches of 20,000 acres each; he drives around day and night to look after them, and has no rest. He is estimated to be worth $40,000,000. He has no children, and his partner, who died, had none, and the case is the same with General Bidwell and other large landowners. The holding of such great estates is against the spirit of republican institutions, and it seems as if Providence were stepping in to insure that they should be sold and divided. It is certainly for the interest of California that they should be, and the same may be said of the great estates purchased in this

country, by English syndicates, and Congress should take action to prevent such concentration of ownership in land.

John Cragin of New York has an immense estate nearly in the centre of the Sacramento valley, with the Sierra Nevada mountains on the east and the Coast Range on the west. He takes a different course in the management of his estate. It is divided into ranches of about 20,000 acres, each in charge of a foreman to whom he pays a salary of about $1,500. He has provided a complete system of irrigation, and is bringing his estate into condition to put on the market. He cultivates alfalfa largely; with irrigation it will yield ten tons of dry hay per acre. This is stored in stacks of about three hundred tons each, and he has about 60,000 tons on hand. Cattle will fatten on it. Mr. Cragin has about ten thousand horses; you cannot buy a single horse, but the surplus is sent to San Francisco and sold at auction; the proceeds of a recent sale of fat steers amounted to $38,000. At Riverside a man fed three horses from one acre of alfalfa.

The people of California are happy, contented and self-satisfied; every one thinks his location the best of all, and where every one has the best, of course there can be no jealousy; but every one wants to sell out. They want from $200 to $350 per acre, which Mr. Ware thought too high; it is rather a prospective value. At Bakersfield, there is the best system of irrigation and all kinds of fruit may be successfully grown there. The speaker saw fine specimens on exhibition; including raisins and nuts of all kinds. The peaches were of enormous size; they are put in a strong pickle to preserve them for show.

Jack rabbits, larger than our rabbits and having long ears, abound to such an extent as to be a perfect nuisance. Parties of two hundred or more, are formed to destroy them; a corral is first built by the hunters, who then surround a circuit of four miles or more, and gradually coming nearer together drive the rabbits into the corral. Ten thousand have been killed in one hunt, and two ladies riding out in a buggy killed two hundred with a rifle.

Riverside is the grand centre of the orange industry. Twelve years ago it was a prairie covered with grass and not a tree was to be seen anywhere. Now Magnolia avenue extends for miles in a straight line, bordered with palms, magnolias, and pepper trees, and the orange groves are enclosed with trimmed hedges of Monterey

cypress. The orange trees come into bearing in about four years; twenty acres have been sold for $40,000. A crop has been sold on the trees for $1,250 per acre, but four hundred to five hundred dollars per acre, is not an unusual price for the fruit. Land and water companies have been formed, and the land sold in lots with water privileges, costing from sixty cents to five dollars per acre. The town is a perfect paradise, filled with beautiful homes; the houses were set back from the streets, and now they can hardly be seen. But oranges cannot be grown without any trouble; the most destructive pest is the cotton-scale; a species of lady-bird, from Australia, was found to be its deadly enemy, and it was imported and propagated, and in two years it destroyed the cotton-scale. There is another scale insect for which another parasite will have to be found, though a kerosene emulsion will destroy it. The gopher, an animal about as large as a rat, destroys orange trees by girdling, but good cultivation will keep them out. The speaker saw orange trees looking yellow, and was told that the owner gathered a large crop, but did not put anything back. He saw a young man from Amherst who went to Pomona with some capital, and had worked hard, and was healthy, happy, and prosperous. Five acres of orange grove is enough for one man to attend to; one can care for such a place better than for a great estate. Mr. Ware concluded by saying that for lack of time and preparation, he had been able to speak of only a very few of the many prominent features of the horticultural resources of California, and that briefly. But though he found California so attractive, he loves his friends and the old associations, and could not afford to leave them. He thanked God that his home is just where it is, but said that unless we go away and return we cannot rightly and fully appreciate our homes.

Discussion.

O. B. Hadwen spoke of the exhibition a few years ago by the Kimball Brothers, of National City, Cal., in the Old South Church, of products of that State, and said that he visited these gentlemen, who are engaged in cultivating olives, guavas, etc., and was most hospitably treated by them.

James Fisher said that he had lived in San Diego two or three years, and that the climate there is in great contrast to that of Oakland. In San Diego there is a breeze from the Pacific every day in the hot season, and the climate is very healthful. Persons

arriving there with bad colds, or even suffering from the sequelæ of pneumonia, have been cured by the climate without taking any remedy. There is no frost and the place is famous for semi-tropical fruits. A variety of lemon with no seeds and very thin skin is cultivated there, and preparations are making to extend its culture very largely. The Messrs. Kimball have an olive-oil factory and there is also one at San Bernardino.

Rev. C. S. Harrison, director of the South-west Division of the Nebraska Horticultural Society, who was present, was called on, and said that he was happy to meet this brotherhood and sisterhood of horticulturists. This was his first visit to New England, and he thought it the grandest place to live in that he had ever seen. He would like to exchange some of the rich western soil for the climate of New England. He had lived among the magnificent conifers of the Rocky Mountains, and been engaged in collecting them and was pleased to recognize them at the Arnold Arboretum and at Mr. Hunnewell's Pinetum at Wellesley. He spoke of the beauty of *Abies concolor*, with blossom buds of the deepest purple and purple cones standing erect, while next to them would be trees with cones of green. On the great plains Norway spruce trees lose their heads, but trees brought from the mountains do very well.

The announcement for the next Saturday was a paper on "The Huckleberry," by Dr. E. L. Sturtevant of South Framingham.

BUSINESS MEETING.

SATURDAY, January 18, 1890.

An adjourned meeting of the Society was holden at half past eleven o'clock, the President, William H. Spooner, in the chair.

The Annual Report of the Treasurer was read by the Secretary, accepted, and referred to the Committee on Publication.

The Secretary read a letter from W. W. Dunlop, Secretary of the Montreal Horticultural Society, thanking this Society for the prompt action taken in regard to the appointment of a Delegate and Judge for the Convention of Fruit Growers of the Dominion of Canada.

Adjourned to Saturday, January 25.

MEETING FOR DISCUSSION.

Huckleberries and Blueberries — Gaylussacia and Vaccinium sp.

By E. Lewis Sturtevant, M. D., South Framingham, Mass.

In New England the only vernacular names that I have heard applied to this class of fruits have been Huckleberries for *Gaylussacia resinosa*, T. and G.; Blueberries for *Vaccinium Pennsylvanicum*, Lam., *V. Canadense*, Kalm, and *V. vacillans*, Solander, which are not distinguished apart when collected for market purposes, and Dangleberries for the fruit of *Gaylussacia frondosa*, T. and G. The fruit of *Gaylussacia dumosa*, T. and G., occasionally appears in the New Bedford markets under the name of the Hairy Huckleberry; and the unexcelled fruit of *Vaccinium corymbosum*, L., under the name of Bush Blueberries. Gray in his Synoptical Flora applies in a generic sense the word Huckleberry to the *Gaylussacias;* and Blueberry, Bilberry, or sometimes Huckleberry and Cranberry to the *Vacciniums*. Authors have not, however, made a very clear discrimination in the vernacular nomenclature, and there is much confusion. I have never yet heard the words Whortleberry and Bilberry used by uneducated country people, and yet these words are given prominence in American Cyclopedias and American authors. The popular method, in New England at least, seems to be to apply the name of Huckleberries to those kinds in which the seeds are prominent in the chewing, and Blueberries to those other kinds in which the seeds are not noticeable, regardless of the real color.

The word Whortleberry, among American botanists, was used by Bigelow, 1824 and 1840; Eaton, 1840; Provancher, 1862; Emerson, 1875, and Gray, 1886, as also by Roger Williams in colonial times. The same authors use the word Bilberry, as also Josselyn in 1663, who says "two kinds;— black and sky-colored, which is more frequent;" Elliott in 1821, and Torrey in 1843. The most modern local New England Floras use only the words Huckleberry and Blueberry with the necessary additions as Bush, Swamp, or Low, etc.[1]

[1] Under date of December 7, 1889, Mr. W. R. Gerard, of New York, an authority on plant names, writes me:—

"Huckleberry is merely a corruption by the American colonists of Hurtleberry. The first example of the word that I have met with is in 'The Historical Description

Plants of the genus Vaccinium (*V. myrtillus*, L.) seem to have been called Myrtillus by the Latin writers of the middle ages, and the fruit Myrtle-berry by the apothecaries. Prior, in his "Popular names of British Plants," 1870, p. 121, derives Whortleberry as a corruption from Myrtleberry, and Hurtleberry and Huckleberry in turn as corruptions of Whortleberry. Others derive the name Whortleberry from the Anglo-Saxon *heort-berg*, hart-berry, or as we should now say deer-berry. Tusser mentions hurtil-berries amongst the fruits of his time. Later, in 1586, Lyte's Dodoens says the true English name for *Vaccinium myrtillus*, L., and *V. Vitis-Idœa*, L., are "whorts, of some whortel berries." Gerarde, in his editions of 1597 and 1636, gives the English names for *V. myrtillus*, L., as "Whortes, Whortle-berries, Blacke Berries, Bill Berries and Bull Berries, and in some places Winberries." Parkinson, in 1640, says: "and we Whorts or Whortle berrys, and Bill berries with us about London." The word Bill-berry also takes on the frequent form of Blae-berry, and the occasional form of Bull-berry.

A satisfactory explanation of the word *huckleberry* and a record of an early use of the word *blueberry* I have yet to find. The word *huckleberry* does not occur in any English author I have consulted except in those of very recent date. Both words occur in Bigelow's "Flora of Boston," 1814, and the first in the index to Pursh's Flora of the same date. Neither occurs in Eaton's Botany of 1840.

The species of North American representatives of our two genera, which are recorded as bearing edible fruits, are:

Gaylussacia dumosa, T. and G.
" *frondosa*, T. and G.
" *resinosa*, T. and G.
" *ursina*, T. and G.

---

of the Province and County of West New Jersey,' by Gabriel Thomas (London, 1698). In another essay by the same author 'of the Province and County of Pensilvania' (*sic*) of the same date, we find Hartleberries. Hartleberry is simply a changed pronunciation of Whortleberry, which again is a corruption of Myrtleberry. The early use of the word Huckleberry may be found in Beverly's Virginia (1705) where we also find Hurts; and in a 'Description of South Carolina' (1710). Wood in his 'New England's Prospect' (1629) has Hurtleberry; so in a 'Narrative of the Colonies of Carolina and Georgia,' by Tailpe and others (1741.)

"'Common folks' when they hear a plant name which they do not understand, are apt to twist it into all manner of shapes, and pay no attention to the laws of letter changes formulated by Grimm. Huckleberry is an American name. The corruption from Hurtleberry is very easy by dropping the first *r*, *i. e.* Hutleberry."

Vaccinium cæspitosum, Michx.
" *Canadense*, Kalm.
" *corymbosum*, L.
" *myrtilloides*, Hook.
" *myrtillus*, L.
" *ovalifolium*, Smith.
" *ovatum*, Pursh.
" *parvifolium*, Smith.
" *Pennsylvanicum*, Lam.
" *salicinum*, Chamisso.
" *stamineum*, L.
" *uliginosum*, L.
" *vacillans*, Soland.
" *Vitis-Idæa*, L.

To be classed with *cranberries*, however, to which the last named may be considered, from a horticultural view, as a connecting link, we have

Vaccinium erythrocarpon, Michx.
" *oxycoccus*, L.
" *macrocarpon*, Ait.

We will now review the species in alphabetical order:

A. Gaylussacia, H. B. K.

1. *Gaylussacia dumosa*, T. and G. Gray, Syn. Fl., 2, 1, 19.
Synonyme, " hirtella, Torr., Fl. N. Y., i, 448.
" Vaccinium dumosum, Andr., Bot. Rep., t. 112; Curt. Bot. Mag., t. 1106; Pursh, Fl., 285; Ell., Sk., 1, 497; Torr., Fl., i, 414.
" Decamerium dumosum, Nutt.

Sandy swamps, Newfoundland and along the coast to Florida and Louisiana; southward especially passing freely into

var. hirtella, Gray.
G. hirtella, Klotz, in Lin., XIV, 48.
Vaccinium hirtellum, Ait., Kew., ed. 2, ii, 357.

The berry is described by Bigelow as hairy, black, watery, and insipid. Elliot says simply that they are eaten; Chapman, that the diameter of the berry is from one-third to one-half an inch.

On the Massachusetts coast the berry is of medium size, little hairy or hairy, far from insipid, and while not equalling the fruit of the other species is yet considered of sufficient value to be occasionally sold in the New Bedford markets, as I am credibly informed by a botanist friend, E. W. Hervey.

This species was called the Hairy Whortleberry by Bigelow in 1824; Bush Whortleberry by Eaton in 1840; Dwarf Swamp Huckleberry by Torrey in 1843; Dwarf Huckleberry by Gray in 1867 and Dame and Collins in 1888; Bush Huckleberry by Emerson in 1875.

2. *Gaylussacia frondosa*, T. and G. Gray, Syn. Fl., 2, 1, 19.
Synonyme, Vaccinium frondosum, L., sp., 499; Andr., Bot. Rep., t. 140; Bigel., Fl. Bost., 152; Pursh, Fl., 1285; Ell., Sk., i, 497; Torr., Fl., i, 415.
" " venustum, Ait., Kew., 2, 11.
" " glaucum, Michx., Fl., i, 231.
" " decamerocarpon, Dunal in D. C. Prod.
" Decamerium frondosum, Nutt.

Low and shaded grounds, coast of New Hampshire and southward; mountains of Pennsylvania to Kentucky, Lousiana, and Florida.

Pursh says the berries are large, blue, globular, eatable; Bigelow that they are sweet, few in number, ripening late; Elliot that this species yields the best flavored fruit. About New Bedford the berries are of fair but not high quality, the shrubs yielding most profusely in some seasons and the fruit is picked under the name of Dangleberries, for local consumption and sale. Had we not the superior *Vaccinium corymbosum*, we might well urge attempts at culture for this species, on account of its habits of growth, its occasional extreme prolificacy, and the ease of picking, together with the fair quality of the fruit.

The vernacular names given are Blue Tangles by Pursh, in 1814, Torrey in 1843, Gray in 1867, and Wood in 1875; Late Whortleberry by Bigelow in 1824 and 1840; Blue Whortleberry by Eaton in 1840; Dangleberry by Torrey in 1843; Gray, 1867; Emerson, 1875; Robinson, 1880; Dame and Collins, 1888, and this is the most appropriate name, and the only one I have heard

used; Blue Dangleberry by Fuller in the Small Fruit Culturist, 1867; High Blueberry by Wood in 1875.

3. *Gaylussacia resinosa*, T. and G. Gray, Syn. Fl., 2, 1, 20.
Synonyme, Vaccinium resinosum, Ait., Kew., 2, 12; Michx., Fl., 1, 232; Bot. Mag., t. 1288; Ell., Sk., i, 498; Pursh, Fl., 1286; Bigel., Fl. Bost., 150; Torr., Fl., i, 415; Hook., Fl. Bor. Am., 2, 31.
" " parviflorum, Andr., Bot. Rep., t. 125.
" Andromeda baccata, Wang. Amer., iii, t. 30, p. 69.
" Decamerium resinosum, Nutt.

This species occasionally has varieties with white fruit. Hervey[2] mentions them about New Bedford, and Westbrook[3] records them in New Jersey. "They are only white when grown and ripened in the shade. If partially exposed to the sun, they will have a pink cheek. When exposed to the full rays of the sun, as in a field, they will be either pink or of a bright scarlet color."

Rocky woodlands and swamps, Newfoundland to Saskatchewan and South to Upper Georgia. The only species in the Northern Mississippi States, where it is rare.

Pursh says the berries are black, eatable; Bigelow, that the fruit is globular, black, sweet; Gray, that the fruit is black, rarely varying to white, without bloom, pleasant. This species furnishes the Huckleberry or Black Huckleberry of our markets. I am hardly of those who recommend this sort for cultivation, as the fruit is not of the best, although the best of the Huckleberries, being excelled in quality by the Blueberries, and the habits of the plant are not such as to commend it.

The vernacular names are given as Black Huckleberry by Bigelow, 1814, 1824, 1840; Torrey, 1843; Fuller, 1867; Gray, 1867; Wood, 1875; Emerson, 1875; Robinson, 1880. As Black Whortleberry by Bigelow, 1814, 1824, 1840; Eaton, 1840; Emerson, 1875. As Huckleberry by Gray, 1886.

4. *Gaylussacia ursina*, T. and G. Gray, Syn. Fl., 2, 1, 20.
Synonyme, Vaccinium ursinum, M. A. Curtis in Am. Jour. Sc., XLIV, 82.

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[2] Flora of New Bedford, 1860. [3] Garden and Forest., Jan. 2, 1889, p. 10.

Moist woods, confined to the mountains of the southern part of North Carolina and adjacent parts of South Carolina.

Gray in his "Chloris Americana," 1846, says the fruit, though edible, and indeed not unpleasant when fully ripe, has not the fine flavor of the other species, and is seldom eaten; in his "Synoptical Flora," he says, "fruit, reddish, turning black, insipid."

The vernacular names are Bear-berry and Bear Huckleberry.

B. Vaccinium, L.

1. *Vaccinium cæspitosum*, Michx. Gray, Syn. Fl., 2, 1, 24; Hook., Fl. Bor. Am., 2, 33, t. 126, and Bot. Mag., t. 3429.

Hudson's Bay and Labrador, alpine summits of the White Mountains of New Hampshire, and Colorado Rocky Mountains to Alaska.

Var. *arbuscula*, Gray *l. c.*, in Oregon passes into the ordinary form and into var. *cuneifolium*, Nutt., Mem. Am. Phil. Soc., n. ser., VIII, 262. Mountains of Colorado and Utah to California, British Columbia, and east to Lake Superior.

Gray says the berry is quite large, blue with a bloom, sweet; Wood that the berries are large, globous, blue, eatable.

Wood gives Bilberry as the vernacular name.

2. *Vaccinium Canadense*, Kalm. Richards, in Franklin, ed. 2, 12; Hook., Fl. 2, 32, and Bot. Mag., t. 3446; Gray, Syn. Fl., 2, 1, 22.

Synonyme, Vaccinium album, Lam. Dict., i, 73, not L.

Swamps or low woods, Hudson's Bay to Bear Lake and the northern Rocky Mountains; south to north New England; mountains of Pennsylvania and Illinois.

This species is abundant in certain swamps in Maine, and the berries are largely collected and sent to market under the name of Blueberries. The quality is excellent.

It is called Black Bilberry by Torrey 1843; Canada Blueberry by Provancher, 1862; Gray, 1867; Fuller, 1867; Dame and Collins, 1888.

3. *Vaccinium corymbosum*, L. Smith in Rees's Cyc., No. 13; Gray, Syn. Fl, 2, 1, 22; Ell., Sk., i, 498.

Synonyme, Vaccinium disomorphum, Michx., Fl., i, 23.
" (1) var. *amœnum*, Gray, Man., ed. 5, 292.
" V. amœnum, Ait., Kew., 2, 12; Andr., Bot. Rep., t. 135; Bot. Reg., t. 400.
" V. corymbosum, var. fuscatum, Hook., Bot. Mag., t. 3433?
" (2) var. *pallidum*, Gray, Man., ed. 5, 292.
" V. pallidum, Ait., *l. c.*; Gray, Man., ed. 1, 262.
" V. albiflorum, Hook., Bot. Mag., t. 3428.
" V. constablæi, Gray in Am. Jour. Sc., XLII, 42; Chapm., Fl., 260.
" (3) var. *fuscatum*, Gray, Syn. Fl., 2, 1, 23.
" V. fuscatum, Ait., *l. c.*
" (4) var. *atrococcum*, Gray, Man., ed. 5, 292.
" V. fuscatum, Gray, Man., ed. 1, 262.
" V. disomorphum, Bigel., Fl. Bost., ed. 2, 151.

Swamps and low woods, from Newfoundland and Canada through the Atlantic States to Louisiana, but rare in the Mississippi region. Variety 1 is found mainly in the Middle Atlantic States; variety 2 is common through the Alleghanies southward, mostly on the tops of the higher mountains; variety 3 occurs in Alabama and Florida to Arkansas and Louisiana; variety 4 is common from north New England to Pennsylvania.

This species is very variable not only in the habit of growth, but in its blooming characters and fruit. It furnishes the best of our fruits of the huckleberry or blueberry class. Large, covered with a blue powder, acid and sweet, and of a peculiar, delicate, attractive flavor. I have measured berries in number from single plants that covered five-eighths of an inch in diameter. In the Carolinas, Elliott in his sketch of the Botany says, the fruit is indifferent to eat; Bigelow, in Massachusetts, that they are large, acid and sweet, and that the variety *atrococcum* has small, polished, black berries, and I can add of excellent savor. The plant grows in all kinds of soil, attains often a considerable size, is, in individual plants, especially fruitful, and bears its berries often in dense clusters. These berries are gathered by the country people, and are preferred in the markets. It offers as a species especial advantages for removal into culture, and it is only necessary to search the places where it grows in order to discover varieties of

exceptional merit. I have noticed that plants of similar quality, whether as appertaining to a prolific habit or size of fruit, are usually to be found together, and this indicates that such characteristics are transmissible by seed. The most prolific plant I ever found was growing on a dry rock; the largest fruited clump of plants extended from a dry upland to and within the borders of a swamp, thus indicating the variety of soil that accommodates this species. It also flourishes in the sunlight and in partial shade.

It was called Blueberry by Bigelow in 1814; Bilberry likewise, and by Torrey in 1843; Bilberry or Bullberry by Elliott in 1821; Blue Bilberry by Bigelow in 1824 and 1840, Eaton in 1840, Torrey in 1843, and Provancher in 1862; Giant Whortleberry by Eaton in 1840: Tall Swamp Huckleberry by Torrey in 1843; High Blueberry by Provancher in 1862, as also High Whortleberry and Blue Huckleberry; Common Blueberry by Gray, 1867; Swamp Blueberry by Gray and Fuller in 1867, Robinson in 1880, and Dame and Collins in 1888; High Bush Huckleberry by Fuller in 1867 and Emerson, 1875; Swamp Huckleberry by Emerson, 1875; Common High Blueberry by Wood, 1875, and High Bush Blueberry by Robinson, 1880, the preferable name.

The variety *atrococcum* is called Black Bilberry by Bigelow in 1824 and 1840; and Black High Bush Huckleberry by Fuller in 1867.

4. *Vaccinium myrtilloides*, Hook. Gray, Man., ed. 5, 291, Syn. Fl., 2, 1, 24.

Synonyme, Vaccinium myrtilloides, partly, Hook., Fl., 2, 32, and Bot. Mag., t. 3447 (excl. Syn. Ait., etc. and var. rigidum), not Michx.

" " membranaceum, Dougl. ined. Torr., Bot. Wilkes's Exp., 377.

Damp woods, Lake Superior to the coast of Oregon and British Columbia.

Hooker says the fruit is much relished by the natives of the North-west Rocky Mountains. T. J. Howell, of Oregon,[4] says the berries are large, one-half or three-quarters of an inch in diameter, flat, with a broad calyx, of good flavor and in every way a good berry. He calls the shrub Large Blue Huckleberry.

[4] Case's Bot. Index, 1881, 38.

5. *Vaccinium Myrtillus*, L. Schk., Handb., t. 107; Reichenb., Ic. Germ., t. 1169; Hook., Fl., 2, 33; Gray, Syn. Fl., 2, 1, 24.

Synonyme, Vaccinium myrtilloides, Watson, Bot. King's Ex., 209, not of others.

Europe, Asia, Rocky Mountains of North America, extending as far south as Colorado and north-east Utah, and north-west to Alaska.

Lyte's Dodoens, 1586, mentions "som that beare white berries when they be ripe; howbeit they are but seldome seene." White fruits are catalogued by Ruppius in his "Flora Jenensis," in 1726, and were also found by Gmelin in Siberia, 1768. This variety with white berries has also been found in Scotland, according to Phillips.

In the Orkneys the fruit is of large size and a wine of fine flavor has been made from it.[5] The Highlanders of Scotland eat the berries in milk, and make them into tarts and jellies, which last they mix with their whiskey to give it a relish to strangers.[6] Bryant[7] mentions that in England they are taken to market to be eaten raw or made into tarts, etc., and their present use for these purposes in England is frequent.[8] In Lapland they are esteemed a delicacy, prepared in various ways,[9] and are eaten fresh or dried in Sweden.[10] In France they are esteemed as a fruit,[11] and are used for coloring wine. In Poland the ripe berries mixed with wood strawberries are esteemed as a great delicacy.[12] They are eaten also in Germany, and Caesalpinus mentions their use in the Alpine region, where they are called *Bagolae*. In Siberia Gmelin says they occupy no mean place at dessert, and in the Rocky Mountain region of America they are a favorite food for the Indians.[13]

The various English names are Whortleberry, Black Whorts or Whorts, Bilberry, and Blaeberry. In Sweden they are called in Upland, Blabar; in Smoland, Slynnon; in West-Gothia, Slinner; in Scania, Bollion; in Lapland, Zirre and Zerre; in France, Airelle, Aurelle, Myrtilles, Myrtille des bois, Bluete, or in Brittany, Lucets,

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[5] Dickson, Pr. Essays H. Soc., 2d ser., VII, 132.
[6] Lightfoot, Fl. Scot., i, 201.
[7] Bryant, Fl. Diaet., 1783, 132.
[8] Masters, Treas. of Bot, 2, 1103.
[9] Linnæus, Fl. Lap., n. 143.
[10] Aspelin, Fl. Oecon., 1748, 520.
[11] Noisette, Man., 1829, 448.
[12] Don., Gard. Dict., 3. 852.
[13] U. S. Dept. Agr. Rept., 1870, 415.

and in Normandy Mawrets; in Brabant, Crakebesien, Haverbesien, Postelbesien; in Germany, Heydelbeeren, Bickbeeren, Blawbeeren, Schwartzbeeren, Koltzbeeren, Pickelbeeren, Besnigen; in Bohemia, Czerne iahody; in Italy, Myrtillo; in Russia, Ticherniza.

6. *Vaccinium ovalifolium*, Smith in Rees's Cyc., No. 2; Hook., Fl., 2, 33; Gray, Man., ed. 5, 291, Syn. Fl., 2, 1, 24.

Synonyme, Vaccinium Chamissonis, Bong., Sitk., 525.

Woods, south shore of Lake Superior and Oregon to Unalaschka, and Japan.

This is the *le brou* plant of the north-west, being used to make a dainty of that name. The berries are gathered before quite ripe, are pressed into a cake, then dried and laid by. When used a quantity is put into a vessel of cold water and stirred rapidly with the hand until it assumes a form not unlike soap-suds. It is pleasant to the taste, with a slightly bitter flavor.[14]

7. *Vaccinium ovatum*, Pursh, Fl., 290; Lindl., Bot. Reg., t. 1354; Gray, Syn. Fl., 2, 1, 25.

Synonyme, Vaccinium lanceolatum, Dunal in D. C. Prod., VII, 570.

" Metagonia ovata, Nutt.

Vancouver's Island to Monterey, etc. California, on hills near the coast.

Douglas says the fruit is black and pleasant; Torrey that the berries are edible, but small; Gray that the berries are reddish, turning black, small, sweetish.

8. *Vaccinium parvifolium*, Smith in Rees's Cyc., No. 3; Hook., Fl., t. 128; Gray, Syn. Fl., 2, 1, 24.

Shady and low woods. Northern part of California, near the coast, to Alaska and the Aleutian Islands.

Don says the berries are red and make excellent tarts. T. J. Howell,[15] Oregon, calls it the Red Huckleberry and says the

[14] R. Brown, Jr., Bot. Soc. of Edinb., IX, 384. [15] Case's Bot. Index, 1881, 38.

berries are good size, sour, but of good flavor. Gray that the bright red berries are rather dry and hardly edible.

9. *Vaccinium Pennsylvanicum*, Lam., Dict., 1, 72; Michx., Fl., i, 223; Hook., Bot. Mag., t. 3434; Gray, Man., ed. 1, 261, Syn. Fl., 2, 1, 22.

Synonyme, Vaccinium myrtilloides, Michx., *l. c.*
" " tenellum, Pursh, Fl., 1, 288, not Ait.; Bigel., Fl. Bost., 150.
var. *angustifolium*, Gray, *l. c.*
" V. angustifolium, Ait., Kew., ed. 2, ii, 356.
" V. salicinum, Aschers. in Flora, 1860, 319, not Cham.

Dry hills and woods. Newfoundland to Saskatchewan and southward to New Jersey and Illinois; commoner northward; the variety, Labrador and Hudson's Bay, Newfoundland and Alpine regions of the White Mountains of New Hampshire.

This furnishes the larger part of the blueberries of our markets. The berries are described by Pursh as large, bluish black, extremely sweet and agreeable to eat. He says the mountains of Pennsylvania produce an immense variety of this species in size and shape of the fruit, leaves, and flowers. This is the early Blueberry of New England, and immense quantities are gathered for market. In my estimation the fruit ranks second only to *V. corymbosum*. The plant is low growing, extremely prolific, and flourishes best on dry hills and pastures. When mown down the shoots spring up very straight and without side branches, the upper third one mass of bloom, and the berries can thus be stripped off by handfuls. This is one of the species that are deserving attempts at culture or protected culture.

It was called Low Blueberry by Bigelow in 1824 and 1840, and Emerson, 1875; Dwarf Blue Huckleberry and Sugar Huckleberry by Torrey in 1843; Black-blue Whortleberry by Eaton in 1840; Dwarf Blueberry by Gray in 1867, Fuller, 1867, Robinson, 1880, Dame and Collins, 1888; Common Low Blueberry by Provancher, 1862, and Wood, 1875.

Pursh gives the name of Bluets for the variety *angustifolium*.

10. *Vaccinium salicinum*, Cham. Spreng., Syst. Cur. Post., 147, and Linnaea, i, 525 (not Aschers., *l. c.*); Gray, Syn. Fl., 2, 1, 23.

Found by Chamisso at Unalaschka, in moss.

Pickering gives this species among the edible berries collected and dried by the natives of north-west America.

11. *Vaccinium stamineum*, L. Andr., Bot. Rep., t. 263; Gray, Syn. Fl., 2, 1, 21.

Synonyme, Vaccinium elevatum, Soland. Dunal in D. C. Prod., VII, 567 (excl. var.).

" " album, Pursh, Fl. 1, 284, not L.

Dry woods, Maine to Michigan and south to Florida and Louisiana; rare west of the Alleghanies.

The berries are described by Pursh as green, or white when perfectly ripe. Gray says they are large, pear-shaped or globular, mawkish. Elliot that they are eaten. Another authority[16] says they are an agreeable fruit, growing in Wisconsin and Michigan, of which the Indians make extensive use.

Pursh and Gray give the vernacular name Deerberry; Clayton[17] calls them Goose-berrys; in Michigan and Wisconsin[16] they are known as Squaw Huckleberries.

12. *Vaccinium uliginosum*, L. Fl. Dan., t. 581; Reichenb., Ic. Germ., XVII, t. 1168; Gray, Syn. Fl., 2, 1, 23.

Synonyme, Vaccinium pubescens, Hornem., Fl. Dan., t. 1516.

" " gaultherioides, Bigel.

Europe, Asia, Arctic America to the alpine regions of the mountains of New England, New York, and shore of Lake Superior, westward to Oregon and Alaska.

Don describes the berries as large, juicy, black, covered with a mealy bloom, eatable but not either very grateful or wholesome. Aspelin says they are eaten in Sweden by children and Guinea hens, but that they often induce trembling. Lamarck says they are of agreeable savor. Some of the Siberian tribes, as Gmelin

[16] U. S. Dept. Agr. Rept., 1870, 415.

[17] Gron., Virg., 1762, 60.

reports, hold them in esteem, yet they are believed there, as among the mountaineers of Switzerland, the Jura, and Thuringia, to promote intoxication. Pursh says the blueish black berries are eatable; Richardson that beyond the Arctic circle the fruit in good seasons is plentiful to an extraordinary degree, and is of finer quality than in more southern localities. The western Eskimos, according to Seemann, collect the berries and freeze for winter use.

This fruit is called Bog Bilberry by Richardson; Bog or Great Bilberry by Miller, Mawe and Don. Greater Bill-berry by Du Roi. In Germany Drunkelbeeren, Dunkelbeeren, Drumpelbeeren, Rauschbeeren, Grosse Heidelbeeren, Rosbeeren, Bruchbeeren, Krackbeeren, Jugelbeeren, Moosheidelbeeren, Ruhthecker, according to Du Roi. Gmelin gives the Russian names as Pjaniza, Golubiza, Golubel, and Gonobobel.

13. *Vaccinium vacillans*, Solander. Gray, Man., ed. 1, 261; Syn. Fl., 2, 1, 22; Torr., Fl. N. Y., i, 445.

Synonyme, Vaccinium virgatum, Bigel., Fl. Bost., 152, not Ait.
" " Pennsylvanicum, Torr., Fl., i, 416, not Lam.

Dry and sandy woodlands and rocky places, New England to North Carolina and Missouri.

Bigelow describes the berries as large, covered with a blue powder, very sweet. The quality is excellent, and they ripen somewhat later than some of the other species. This seems to be one of the species which are deserving of cultural attempts, as the plant is somewhat taller growing than *V. Pennsylvanicum*, Lam.

Torrey in 1843 uses for names the Low Blue Huckleberry and the Sugar Huckleberry. Emerson in 1875 calls it the Blue Huckleberry, while Low Blueberry is used by Gray in 1867, Robinson in 1880, and Dame and Collins, 1888.

14. *Vaccinium Vitis-Idœa*, L. Fl. Dan., t. 40; Lodd., Bot. Cab., t. 616; Gray, Syn. Fl., 2, 1, 25.

Synonyme, Vaccinium punctatum, Lam.

Round the Arctic Circle, Europe, Asia, Greenland to Japan;

in this country south to the coast and mountains of north New England and Lake Winnipeg; on the western coast south to British Columbia.

In England, according to Bryant, the berries are collected for use in making tarts, jellies, etc. Miller says they are scarcely to be eaten raw, but are made into pies in Derbyshire, but their flavor is far inferior to that of cranberries. In Sweden, according to Linnaeus, they are sent in large quantities to Stockholm for pickling, and Aspelin says jellies are made from them, and in Lapland an esteemed preserve. In Siberia, Gmelin reports their use as a winter preserve, and says they are greedily eaten in a raw state. Gray says the dark red, acid and bitterish berries are a fair substitute for cranberries when cooked, and Thoreau speaks of using the berries stewed and sweetened, in Maine. Richardson reports them as plentiful and much used throughout Rupert's land, called by the Crees *wi-ea-gu-mina*, and says this berry is excellent for every purpose to which a cranberry can be applied. The Western Eskimo, on the authority of Seemann, collect the berries in autumn and freeze for winter use.

In England called Red Whorts, according to Miller, Bryant and Du Roi, or Red Whortleberry; in America, Cowberry and Mountain Cranberry, according to Gray; in Germany, Kronsbeeren, Preusselbeeren, Krausbeeren, Rothe Heidelbeeren, Steinbeeren, Krenbeeren, Kranbeeren, Crandenbeeren, Holperbeeren, according to Du Roi. In France, Airelles Rouge; in Russia, Brussniza according to Gmelin, and in Japan Koke-momo and Iwa-momo, according to Rein.

We now make a brief review of the cranberry species:

15. *Vaccinium erythrocarpon*, Michx., Fl., i, 227; Gray, Syn. Fl., 2, 1, 25.

Synonyme, Oxycoccus erectus, Pursh., Fl., 264.
" " erythrocarpus, Ell., Sk., i, 447.

Damp woods, in the higher Alleghanies, Virginia to Georgia.

The transparent scarlet berries, according to Pursh, are of an exquisite taste. Gray says the berry is light red, turning nearly black at full maturity, watery, slightly acid. The plant is a shrub one to four feet high.

16. *Vaccinium macrocarpon*, Ait., Kew., ii, 13, t. 7 ; Bot. Mag., t. 2806 ; Gray, Syn. Fl., 2, 1, 26.

Synonyme, Vaccinium oxycoccus, var. oblongifolius, Michx., Fl., i, 227.

" Oxycoccus macrocarpus, Pursh, Fl., 264 ; Bart., Fl., i, t. 17.

Bogs, etc., Newfoundland to North Carolina, through Northern States and Canada to Saskatchewan, and the Columbia River.

The American cranberry is described by Josselyn in his rarities (*fidi Raii*), and Ray, 1704, gives the American names as Cranberries and Bear Berries. Roger Williams gives the Indian name as Sasemineash. In 1686, Ray describes the berry, sent him from New England. Douglas says the fruit is boiled and eaten by the natives of the Columbia River region under the name of Soolabich. In 1814, the culture first commenced in England,[18] although the plant was introduced in 1760.[19] In this country the culture, which has now attained great success, was first commenced on a very small scale about 1840.[20]

The use now with us is very large, and the berries are shipped abroad in large quantities, being preferred in England to the fruit of their native cranberry.

17. *Vaccinium Oxycoccus*, L. Fl. Dan., t. 80 ; Eng. Bot.. 319 ; Schk., t. 107 ; Gray, Syn. Fl., 2, 1, 25.

Synonyme, Oxycoccus palustris, Pers., Syn., 1, 419.

Sphagnous swamps, through Europe, North and Middle Asia, North America, Greenland to Japan, around the subarctic zone from Newfoundland and Labrador south to the mountains of Pennsylvania, to the Saskatchewan district and to Alaska.

In Britain called Cranberry or Fen-berry or Marsh-worts (Prior) ; Russian, Klinokwa (Gmelin) ; Japanese, Aka-momo and Iwa-haze (Rein) ; in Germany, Moss-beer (Eyst.).

We thus find four edible Huckleberries (Gaylussacia), fourteen edible Blueberries (Vaccinium), and three edible Cranberries (Vaccinium, section Oxycoccus).

We have given the vernacular names *ad nauseam* to give prominence to the confusion that exists, and to call attention to the

[18] Phillips, Comp. to the Orchard, 116.

[19] Ait., Kew., 1789, 13.

[20] Eastwood, Man. of the Cranb., 1856.

deplorable habit among authors of often giving words of their own coining rather than those in habitual use.

Huckleberries and Blueberries have been strangely overlooked both by horticulturists and annalists. Notwithstanding the great use that must have been made of the berries by the Indians and early colonists on the New England coast, yet I find but few records referring to it. Roger Williams speaks of "divers sorts" used by the Indians under the name of Attitaash. Parkinson refers to Champlain in 1615, who found the Indians near Lake Huron gathering blueberries for their winter store. Kalm speaks of the Indians drying the berries in the sunshine or by the fireside for winter use. These are the only references I have noted.

The blueberry must have been an esteemed fruit since the colonization of northern America, and is now collected for the markets in vast quantities, yet its culture seems to have been almost entirely omitted. I find but few recorded attempts, and these only within the last few years. In 1886, Frank Ford & Sons, Ravenna, O., included them in their nursery catalogue, as follows:

High-Bush Huckleberry or Blueberry. (Presumably *V. corymbosum.*) This grows six to eight feet high, fruit large size and brings the highest price in market. Although a seedling of the swamp variety, it can be grown on any soil. . . .

Dwarf Huckleberry. (Presumably *V. Pennsylvanicum.*) Very early, fruit large, often one-half inch in diameter. Bush grows from six to ten inches in height. This is the earliest variety offered, and yields immensely.

Low Bush Blueberry. (Presumably *V. vacillans.*) Fruit very sweet, and of superior quality; grows from one to two feet high.

Black Huckleberry. (Presumably *G. resinosa.*) Fruit large; bush two to three feet high, productive; in flavor distinct from other varieties, and preferred by many.

Common Swamp Huckleberry. (Presumably *V. Canadense.*) This variety grows in abundance in this vicinity in swamps, and large quantities of fruit are marketed every year. And while we would not recommend this as being as good as the High-Bush described above, for upland culture, as that has been grown for years on upland, it will adapt itself to most soils.

In their introductory this firm say:

"This much neglected fruit, which is of such great value, and so easy of cultivation, ought to be found in every fruit garden.

Its perfect hardiness and adaptation to all kinds of soil, render it as easy of cultivation as any of the small fruits, and it can be grown anywhere that corn will grow.

Plant the large varieties four by five feet apart, and they will form large bushes. The small varieties, plant in rows five feet apart and from one to two feet in the row. Cultivate to keep down all weeds, and prune by shortening in the long growths, to induce the growth of short, fruit bearing laterals, and trim out the old wood when it has ceased to be productive; when they begin to bear, mulch heavily with straw, leaves, wild grass, or any material that will keep the ground moist and cool, and the cultivator will be rewarded by a bountiful crop of delicious fruit."

In the Report of the New York Agricultural Experiment Station for 1883, p. 227, will be found notice of a successful attempt at cultivation about 1868, by W. J. Scott, of Bridgewater, Oneida Co., N. Y. He removed the bushes from a cold, wet swamp to dry and gravelly upland. The plants were of both the High Bush and the Low kind. In 1883, he reported that the plants had borne abundantly. The bushes grew taller and better than those in the swamp, and the berries increased in size.

Discussion.

Jackson Dawson, gardener at the Arnold Arboretum, said he began fourteen or fifteen years ago to grow these plants from seeds, and now has plants of almost every variety that will endure our climate. Mr. Dawson then read a letter, which was received at the Arnold Arboretum in 1885, from E. S. Goff, of the New York Experiment Station, at Geneva, N. Y. It contained an inquiry what to do with his huckleberry plants to make them grow. He had had no difficulty in securing germination, but after the young seedlings attained about five leaves they stopped growing for a few months, and then died gradually. He had used sand, muck, and loam, and various mixtures of these soils, but the result had been the same in all. The soil had been kept pretty wet. Mr. Dawson's reply was published in the "Country Gentleman," for 1885, page 660. Therein he recommended using seed pans four inches deep, half filled with broken crocks, thinly covered with sphagnum. The soil preferred was a compost of one part good fibrous peat (upland preferred), one part well rotted pasture sod, and one (larger) part of clean, fine sand, free

from iron rust, all mixed thoroughly. The pans should be filled to the brim with this soil, which should then be pressed down evenly until firm as possible. The seed, washed free from the pulp, is then to be sown thickly but evenly over the surface, and pressed down with a board and covered with about their own thickness of the same compost. Over this a thin layer of fresh sphagnum is put, and a gentle watering with a fine rose completes the work. The pans should be placed in a cold frame and allowed to get one or two hard frosts. Keep them in the frames until about New Year's, when they may be brought into a night temperature of from 55° to 60°, and day range of 10° higher. They must be watched carefully, watering to keep the soil moist but not saturated. As soon as the seedlings begin to appear the sphagnum should be gradually removed and a little fresh compost, like the soil, sifted in among the seedlings.

When the second rough leaf has expanded, the young plants should be pricked out in fresh pans prepared like the first, syringed slightly and placed in a temperature of 65° at night and 10° higher during the day, with slight shade on the glass during bright weather, keeping the air moist by wetting down the floors when necessary, and but slightly syringing the plants. The shade must be removed and the syringing omitted in cloudy and stormy weather, and it is necessary to close the house when the sun begins to leave it after noon.

About mid-summer, carefully attended plants will have become crowded and need to be transplanted into fresh pans, the same treatment as before being continued to the end of August. Then more air and less water should be given, that the plants may be gradually hardened off, after which they may be placed in cold frames with a southern exposure, where the sash may be removed by day and replaced at night. When frost approaches, protect the frames with mats, that the foliage may be kept on the plants to perfect the ripening of the wood. After the leaves drop, cover the frames with four or five inches of meadow hay, which will protect them through the winter. But on fine days, once or twice each month, the frames should be opened, to dry out any damp or fungus. Early in April make a bed eighteen inches deep, of peat, loam, and sand, well mixed. In this the young plants should be set three or four inches apart, in rows six inches apart. They should be syringed morning and evening during

dry weather, and shaded by lath screens during the brightest sunshine, but these must be removed at night and in cloudy weather, and when the plants are well established the screening may be gradually discontinued.

Toward the end of August watering must be reduced and finally withheld, that the wood may become ripened. As winter approaches the addition of a few inches of fresh soil, between the rows, will afford all needed protection, and in the following spring they can be planted out permanently.

Mr. Dawson has sown seed from September to January, and while most of it grew the first season, some delayed until the second year and then came up well. Seed washed as soon as gathered, sown at once, and exposed to a slight frost, germinated the first season, while seed kept until dry and then sown, even in autumn, and kept in heat all winter, did not start until the second year. The low blueberry and the huckleberry will fruit in from three to four years from the seed, but the high-bush blueberry requires from four to six years.

He had known several who had made plantations in low moist ground with success, but the High Bush Blueberry although naturally growing in swampy low grounds, grows well in any ordinary soil; in fact he had seen plants well fruited although growing in pure sand.

Vaccinium corymbosum and its varieties seem to be the best for experiments. They are much easier to transplant either from the swamp or upland than other species. They are more prolific and the varieties are numerous, and by selection many fine berries can be had. *Vaccinium corymbosum* var. *amœnum* is a fine dwarf form of the species, with very large fruit, and does well on upland. After *V. corymbosum*, he thinks that *V. vacillans* is the next best. Where the woods or pastures containing the blueberry have been burnt over, the bushes produce immense crops the second year following. This being noticed repeatedly has led several parties to buy old berry pastures and systematically burn over a portion each year, thus securing a large crop of fruit from some portion of this land every year. There are many acres in this State that might be treated in this manner, and be more profitable than many other farm crops.

Mr. Dawson said that the varieties in the pastures that are burnt over, and produce such immense crops, are not the common

swamp blueberry. The pasture usually contains *Vaccinium Pennsylvanicum* and varieties, *V. vacillans*, and *Vaccinium corymbosum* var. *amœnum*. The High Bush Blueberry does not come into bearing so soon after the fire as the others mentioned. Further north *Vaccinium Canadense* takes the place of some of the others.

Of the Gaylussacias, the common Huckleberry, *G. resinosa*, is harder to establish than the Dangleberry, but when once established grows well. But under cultivation it does not come up to the blueberry as a fruiting plant.

The speaker had never tried any special fertilizers, but thought a mulch of leaves would be better than stable manure unless well decomposed. He believes the time will come when these fruits will be found in every garden, the same as the strawberry, raspberry, and other small fruits, and in as many varieties.

In Northern New York and Pennsylvania a white form of the Huckleberry is plenty. Sixty-five bushels of these were once sent to the New York market, and, it is said, sold at eight dollars per bushel, while the common blueberries were sold at three dollars. A small patch of this White Huckleberry has been known for a long time at Concord, Mass., and a white form of *Vaccinium vacillans* was found in Plymouth, Mass., several years ago.

Edmund Hersey had experimented in a small way many years, aiming to discover the best method of treatment, and has found that the Low-Bush Upland Huckleberry takes kindly to cultivation, which greatly improves the fruit in size and number. It bears fertilizing well. He found that a portion of muck in the soil, and mulching were good for the plants. The High Bush Blueberry can be cultivated, but it takes less kindly to it than does the first mentioned. The bushes can be transplanted from low lands to high sandy ground, but need shade, as the fruit, if exposed to the sun, is quickly scorched and dried up.

By grafting, better results may be secured. It is easily done, and by marking wild plants which bear the finest fruit, and taking scions from them, superior fruit will soon be had in abundance. Mr. Hersey practices cleft-grafting, in stocks not as large as one's thumb, which are then set out. In this way fine varieties may be propagated. The great drawback is the ravages of birds. The bushes must be covered with netting from the time the fruit begins to turn or the birds will take them. Thus protected, it is

astonishing what enormous quantities of fruit can be had. A square rod of bushes will furnish all that a family would care for. He knew of one bush which yielded a bushel of berries. Some years, however, there is a promise of a good crop, but from some cause few ripen.

Mr. Dawson confirmed Mr. Hersey's statements that the blueberry can be grafted. The method which he prefers is side-grafting near the crown of the root, thereby getting plants free from suckers. The grafting is done under glass from January to April, on young plants that were potted the summer before. The second year after grafting his plants begin to fruit.

Alfred W. Paul said that while huckleberries and blueberries grow so abundantly in the wild state, he doubted the probability of their cultivation proving a financial success.

Mr. Hersey suggested that we should not always consult the financial aspects of experiments. Whatever we can do that will make life happier, and our homes more pleasant will pay. There are many gardens in places where the owners cannot find wild fruit easily, and a few of these bushes under cultivation would be a convenience and also add much to the attractiveness of the home.

Mr. Paul said that Black Huckleberries and Swamp Blueberries grow more abundantly in his vicinity than he had seen anywhere else. Low Blueberries are brought from New Hampshire, in large quantities. When visiting a brother-in-law near Plymouth, in that State, a year or two ago, after the berry season was over, he was told that a neighbor had marketed $2300 worth of blueberries in one season. Mr. Paul saw that a large quantity of this fruit, estimated to be at least fifty bushels per acre, had been left unpicked. With this showing of wild productiveness, would any one think of cultivating the bushes, looking at the matter from a financial point of view?

John C. Hovey held that the idea that the fruits under consideration may be cultivated as easily as anything else, is a mistake. Success may be won, but we should try to adopt natural methods. That appears to have been the case where Mr. Dawson and Mr. Hersey have succeeded in their experiments.

Joseph H. Woodford said that Hon. William Freeman of Cherryfield, Maine, controls a large district there, comprising from thirty to forty thousand or more acres of land. On this

territory he has many natural plantations of berry bushes, and employs a forester all the year round to assist in the care of these areas. They burn over some of these plantations every year, and two years later gather from such portions an immense crop of superior fruit. By this system a great yield is secured every year from some parts of this land. The berries are almost as large as cherries. They will burn over, this year, about one thousand acres of berry bush lands.

William E. Endicott was ready to say that blueberries can be grown as easily as currants, and more easily than many varieties of the raspberry. He has had no experience with Black Huckleberries. Dangleberry seed has always failed to grow with him, but he had been successful in transplanting that species from the woods. He had cultivated the Low Black Huckleberry and thought more highly of it than of the High Bush Blueberry. White Huckleberries are not uncommon in his neighborhood; he had repeatedly found them, but they are generally deficient in flavor.

Mr. Hovey said that it takes a great deal to kill blueberry bushes, especially the high bush blueberry.

Mr. Dawson believed that most people, in taking up plants from the woods or pastures, are so eager to have their berry bushes bear that they select the largest plants. Unless they are taken up with the greatest care, these large plants invariably die, whereas if plants of one or two feet in height were selected and carefully planted they would take hold at once, and in a year or two would be far ahead of the larger plant even if that should struggle through.

Mr. Hersey said that when he transplants large bushes he cuts off the tops.

Notice was given that Professor G. H. Whitcher, Director of the New Hampshire Agricultural Experiment Station, Hanover, N. H., would read his paper on the "Growth and Nutrition of Plants," on Saturday, February 22.

The Chairman of the Committee on Publication and Discussion announced for the next Saturday, a paper on the "Fruits and Flowers of Japan," by William P. Brooks, Professor of Agriculture, in the Massachusetts Agricultural College, Amherst.

BUSINESS MEETING.

SATURDAY, January 25, 1890.

An adjourned meeting of the Society was holden at half-past eleven o'clock, President Spooner in the chair.

On motion of Leverett M. Chase, it was

Voted, That hereafter the Secretary send to each member the Schedule of Exhibitions, enlarged by a notice of the Meetings for Discussion and a notice that the printed Proceedings of the Society can be obtained from the Secretary.

2d. That the Treasurer send notice of assessment to the Annual Members who have not paid by February 1st.

3d. That a copy of the Constitution and By-Laws be presented to each incoming member.

Voted, That the Programme of Meetings for Discussion for the present year be mailed to each member.

On motion of William E. Endicott, Chairman of the Library Committee, it was Voted, That the Library Committee be empowered to employ such additional assistance as is necessary to arrange the books in the Library.

Adjourned to Saturday, February 1st, at eleven o'clock.

MEETING FOR DISCUSSION.

FRUITS AND FLOWERS OF NORTHERN JAPAN.

By WILLIAM P. BROOKS, Professor of Agriculture, Massachusetts Agricultural College, Amherst.

In what I shall say upon the subject which I have chosen I shall restrict myself to a consideration of fruits and flowers which have come more or less under my personal observation in Yesso, the northernmost of the large islands of the Japanese empire, although I am aware that the term "Northern Japan" may be held to include much more territory than is comprised in that island. Indeed, I have been surprised, and in some degree appalled, on looking over my collection and calling upon the resources of my memory, at the wealth of material which, even with this restriction, lies at my disposal. I have feared that my

paper might turn out little more than a bare catalogue, and thus only weary your patience without exciting the interest which from the nature of the subject I have felt that some at least among you would take in it.

I propose noticing some of the most interesting among both the wild and cultivated fruits and flowers of Yesso. Not by any means all of those of which I shall speak are peculiar to this island. Very many, probably nearly all, of the wild species of which I shall speak are found also in some parts of the more southern islands, in many instances on the mountains. How many are the cases I can recall when my hopes of having found something new have been shattered by the discovery that it had been previously collected in some mountain region of the South. Nikko, the celebrated site of the most famous mausoleums and temples of Japan has proved the grave of many hopes of this sort. On reflection, however, it must be perceived that in view of the very mountainous character of the country this is only what should be expected. When it is further remembered that the bodies of water separating the islands of the empire of Japan are nowhere wide enough to offer any great obstruction to plant distribution, and that ocean currents indeed lend themselves to the work, it will not be wondered that there should exist a great degree of similarity in the flora throughout the country wherever suitable differences in altitude counterbalance differences in latitude.

I am particular to bring out this point because I must offer this peculiarity of the Japanese flora as an excuse for alluding, as I doubtless shall, to plants with which many among you are already familiar. Little has been written in English on the flora of Yesso—almost nothing if we except what our lamented Dr. Gray wrote after examination of the collection of the Perry Expedition, a considerable part of which came from the vicinity of Hakodate, in Southern Yesso; but I am sensible that what I shall say will probably in many cases lack the charm of novelty because of the peculiarity to which I have alluded. This however has seemed to me unavoidable, for I am no specialist in either botany or horticulture. In common with most of mankind, I love fruits and flowers; I have known those of which I shall speak in their native haunts; I have loved them, and this must be my excuse for speaking of them. You will, I feel sure, under the circumstances pardon the fact that some of my "coals are brought to Newcastle."

A brief glance at the position, size, and physical peculiarities of Yesso; together with a few remarks upon the nature of its soil and climate and some of the most striking peculiarities of its flora, must precede the mention of any of its special features.

Yesso lies off the coast of Siberia, from which it is separated by the Japan sea, which at the narrowest point between the island and the continent is about two hundred miles broad. The island of Sachalen, which is separated from the continent by a narrow strait, approaches to within about thirty miles of Yesso. The Kuriles on the north also afford a means of connection with Kamchatka; and the larger Japanese islands, with smaller subsidiary chains, make plant immigration from Corea and China a possibility. Thus Yesso is so situated that the way was open for the immigration of Asiatic plants from north, west, and south, and this fact, in connection with climatic and other peculiarities to be mentioned, accounts for the extraordinary richness of its flora.

Yesso lies between about 41½ and 45½ degrees north latitude; and, exclusive of narrow capes, extends from about 140 to 145 degrees east longitude. Its area is about 27,000 square miles,— a little less than the area of Ireland. According to Benjamin Smith Lyman, former Chief of the Geological Survey, the island has 7,000 square miles of land suitable for farming, 6,000 square miles of pasturage, 5,000 square miles of forest, and 9,000 square miles of mountains. He estimates that only about twenty-five per cent of the total area is fitted for cultivation, and from personal observation I judge that even this estimate is too high. The face of the country is very mountainous and rugged, although there are a few broad plains and river valleys. The highest mountains attain an elevation of about 8,000 feet, but the great majority range from 1,000 to 4,000 feet in height; and, except near the sea-shore where the trees have been cut off to supply fuel to the fishermen, they are wooded to their summits. The lower slopes, up to an elevation of about five hundred to one thousand feet, according to locality, are covered with a rich growth of deciduous trees,— maples, oaks, magnolias, Cercidiphyllums, elms, lindens, cherries, and birches predominating. Above these altitudes conifers, chiefly two species of spruce, predominate. All these trees usually reach a large size. The growth is, however, rather open and scattered as a rule, and the undergrowth is characterized by extraordinary luxuriance and density. By far the

most abundant and important plant here found is a kind of bamboo grass (Arundinaria) which in places forms almost impenetrable thickets, varying in height from two or three up to ten or more feet according to the soil and altitude. The leaves of this plant are evergreen, and it constitutes a most valuable and nutritious winter pasturage for deer, and also for cattle and horses which in most parts of the islands keep in good condition on it throughout the winter months. Horses are especially fond of it and will eat it in summer in preference to English grasses. Prudent managers, therefore, during the summer months exclude them from the forests which are to be used for winter pasturage. At times the deep snows of winter quite bury this plant, but horses learn to dig for it, pawing away the snow to reach it. In this way they manage to keep in fair condition through the season. Where this Arundinaria grows it crowds out all other undergrowth. Only trees and climbers can contend with it. One is struck by the enormous number and variety of climbers, woody and herbaceous, both in mountain and plain-land forests. These contribute much to the appearance of tropical luxuriance and richness which every travelled visitor remarks.

Within the limits of an island of the size of Yesso is to be found, as might be expected, a great variety of soils. It is unnecessary to enter into detailed descriptions. Suffice it to say that the greater portion of these soils are still virgin. Until within the last fifteen or twenty years the Japanese people had made no effort to occupy this territory. To them it was a *terra incognita;* to the minds of a race of tropical origin it was a dreadful, frigid wilderness, peopled with ferocious wild beasts and hairy men scarcely less wild. The Japanese fished upon its shores in summer, and a few dwelt there; but no attempt was made to settle in the interior. The virgin soil is in many places of considerable fertility notwithstanding the Japanese proverb: "*Shin den wadzuka ko ho-nen*," which means, "The crops on new land are small." The best will produce at first without manures about fifty bushels of corn, two and a half tons of hay, or four hundred bushels of potatoes per acre; but the soil is not strong, and soon needs manure. According to analyses, even the best is usually deficient in both phosphoric acid and potash, and there is a wide extent of territory, the soil of which, composed largely of volcanic scoriæ and ash, is very light and poor.

The climate of Yesso is in many respects not unlike that of New England; but it is more equable—a little cooler in summer and warmer in winter; and the air is more humid: the percentage of sunshine somewhat less. The yearly means of temperature at Sapporo, the capital of Yesso, in degrees Fahrenheit, from the year 1877 to 1886, inclusive, were as follows: 47.53, 44.79, 45.13, 45.51, 44.82, 45.19, 44.27, 42.69, 44.14, and 46.63. On two or three nights every winter the mercury registers from four to twelve degrees below zero; the really hot weather of the summer is limited to one month, setting in about the middle of July. The autumn frosts are late in coming, seldom destroying even the most tender plants before the middle of October. The yearly precipitation — a large part in the form of snow — varied during the years of my residence between about thirty-three and fifty-five inches. The springs and early summers are dry; the late summers and autumns are rainy. The snow fall is large; the smallest in any winter of the twelve I spent there was nine feet; the largest eighteen feet; the average being about twelve feet. An important point, doubtless as affecting both the indigenous and introduced plants is this: the snow usually falls upon unfrozen ground, or at least the amount of frost is so slight that by the middle of January the ground, even in open fields, is free from it. Carrots, turnips, and potatoes are often left in the ground over winter and come out in the spring uninjured. The soil in the forests can scarcely at any time feel the effects of frost.

Another important climatic peculiarity as affecting vegetation is the comparatively warm and wet autumn, succeeded at last rather suddenly by a heavy fall of snow and colder weather. Such a change usually finds the leaves still green on introduced apple, peach, and cherry trees as well as on raspberry and blackberry bushes.

Those among you who are fruit culturists are familiar with the fact that such a state of affairs indicates wood still comparatively soft and immature and unfitted to withstand the rigors of winter. You will not be surprised then to learn that certain fruit trees, usually hardy here, are there in most cases winter-killed. This fact, viewed in connection with certain peculiarities of the native flora, at first thought appears exceedingly puzzling. In the vicinity of Sapporo were large numbers of two species of magnolia; the one *Magnolia Kobus*, chiefly in the low moist lands; the

other *Magnolia hypoleuca*, chiefly on the dry elevated plains or lower mountain slopes. On trees of both plain and mountain forests of the more open sort — chiefly on elms, alders, and oaks — two species of mistletoe grew in the greatest profusion. On the mountains and in the swamps grew in abundance several species of tender annuals belonging to the gourd family; and in similar localities were to be found several other sub-tropical or warm temperate species not usually found in so high latitudes. And yet where these plants and the species of bamboo grass already mentioned flourished, the peach, the quince, and our hardy raspberries and blackberries were usually sadly winter-killed. Many times have I seen every inch of such trees and shrubs which protruded above the snow utterly destroyed; and often the roots only survived the winter. Why this apparent anomaly? Some of you are prepared for the assertion that the deep snows afford protection to the sub-tropical indigenous plants mentioned; and in so far as the tender herbs and bamboo grass are concerned this is doubtless the true explanation; but how with the magnolias and the mistletoe? Surely the snow cannot protect these, for the branches of other trees bearing the latter are far above its surface.

The explanation is doubtless this; the indigenous species have become inured to the climate: they are not deceived, if I may be allowed the expression, by the favoring warmth and moisture of the autumn. Winter's cold finds their buds and wood prepared to resist its destructive action. Not so the peach, the quince, and the berry bushes from America. The comparatively rich soil and the warm and humid air promote too rapid and long-continued growth which is readily destroyed by the too quickly succeeding cold. That this is the case is evident from the fact that these fruits are cultivated with a fair degree of success on the soils of the lightest and poorest description to be found in the vicinity. On the average soils of the island a requisite to the successful culture of these fruits is winter protection, which I found could be best given by simply bending to the ground and holding there in such a manner that the snows, which usually accumulated to the depth of three or four feet, would cover and protect.

Yesso is not particularly rich in indigenous fruits: comparatively few species are collected and used by the inhabitants to any great extent. Those most extensively used are the following:

a wild strawberry, two species of raspberries, a chestnut, a walnut, a grape, and the *kokuwa*. Huckleberries, checkerberries, cranberries, and blackberries although found are, I think, nowhere abundant and practically never made use of. Some two or three species of strawberries are found; but the only one of any importance is *Fragaria vesca*, which in some districts is so abundant that the manufacture of jam from the fruit was at one time an important industry. This jam by the way was particularly high flavored and delicious. I have cultivated this strawberry in my garden, and have found it unusually vigorous and fairly productive, the fruit being small to medium in size, whitish red when ripe, and very sweet and high flavored, with a taste altogether different from that of our varieties. The chief reason, however, for my mentioning the cultivation of this berry, is to call attention to a peculiarity which I do not recollect to have heard of in any other variety. We have our so-called pistillate sorts in great number. This species, as I cultivated it, was functionally diœcious. A certain proportion of the plants,—in my patch about one-third,—produced large flowers which contained large and perfect stamens but very small and imperfect pistils. These plants never produced any fruit; the flowers simply dried up. These plants were then practically staminate, although the pistils were not entirely aborted. The other plants produced smaller flowers with perfect pistils, and stamens which were much shorter and smaller than in the flowers on the first kind of plants; but even these stamens produced apparently perfect pollen. There was a little difference in the habit of growth and the general appearance of the two kinds of plants which, with practice, I judged would suffice to enable one to select either sort at pleasure. My departure from Japan interrupted the observations upon this most interesting plant that I had in view for determining numerous points which will occur to many of you, and my first attempt at importation made last year proved a complete failure. American varieties of strawberries, of which a number have been tried, do remarkably well in all respects. Of one importation I succeeded in making one plant only of the Sharpless and two only of the Charles Downing live; and yet, before winter set in, without any unusual care, these had increased to fifty and two hundred and fifty plants respectively. This, from plants which on May 1st were hanging between life and death, I considered a remarkable

rate of increase. No artificial winter protection is needed for the vines in Sapporo; the deep snow proves all sufficient. Other covering I found even injurious, tending to cause the rotting of the vines. The period of fruiting was unusually long, commonly covering with a single variety like Wilson's Albany, one entire month, — the month of July.

Of the raspberries, there were some three or four species commonly found: but only two were of practical importance. One of these, *Rubus parvifolius*, is of a low half running habit of growth; the fruit is red but very loosely constructed and soft in texture. The flavor is good, but the impossibility of handling without reducing to a mush makes this fruit nearly valueless except to eat from the bushes. I have cultivated two other species in my garden. One of these, of the same habit of growth as our common red raspberry but with unusually stout canes and not suckering over-freely, produced small, seedy, black fruit of no value. The other, *Rubus phœnicolasius*, has the Black Cap habit of growth, the canes, in good soil stout and tall, not requiring artificial support but with unusually soft and harmless prickles. The fruit is produced in large clusters, is of fair size, and being of a beautiful translucent scarlet color, it presents an exceedingly attractive appearance. It is fairly firm. In flavor it is quite different from anything we have. There is less of the distinctive raspberry flavor and slightly more acid than in our varieties and it is very juicy. Upon telling friends who visited my garden when the fruit was ripe that I had brought it there to see if I could improve it, I was several times met with the remark "I don't see why you should wish to improve this," which perhaps sufficiently indicates its quality. I would not, however, overpraise this fruit. It is distinctly less rich than our common varieties and would not suit those especially fond of the raspberry flavor. It is, however, a hardy, productive, and beautiful species, which may prove valuable in its present or some derivative form. A peculiarity in its habit of growth should be mentioned; the growing fruit is entirely covered and protected by the reddish pubescent calyx until just as it begins to ripen. Whether from this peculiarity or because it is not so sweet, it is certain that this fruit was always remarkably free from worms, while American varieties in my garden were sadly infested. I successfully imported plants of this species last year; and I may remark that I have been informed that at least one nurseryman advertised it for sale last season.

American varieties of both raspberries and blackberries do well here. The vines of all varieties, however, need winter protection. This I found could be best given by bending down over a mound of earth and holding in place with small stakes. Neither earth nor straw covering was necessary, the snow serving every purpose. The season of fruiting is late but long.

The Yesso chestnut, very abundant in many sections and much used by the aborigines of the island as well as by the Japanese, is in size and quality almost identical with the American. It is altogether different from the large chestnut of old Japan, but like that produces fruit very young. The Japanese have a proverb which says, translating literally, "The chestnut in three years, the persimmon in seven," indicating that trees of these fruits will become productive respectively in three and seven years. When planted in Yesso, however, the southern chestnut fails to justify its claims to such precocity, requiring usually fully twice the number of years just mentioned.

The Yesso walnut resembles closely the English walnut, but is inferior in both size and quality to the best specimens of that nut found in our markets. Neither is it anywhere very abundant.

The native grape is *Vitis Labrusca*, the same species, you will recognize, as our own most common wild and cultivated varieties. In Yesso, however, the wild species does not vary as does our own. I have never seen more than one form, a medium to large bunch of small, hard, seedy and very sour berries, of a purple or almost black color with comparatively little bloom. The vine is, however, remarkably rank and vigorous in habit. A specimen with stem fourteen inches in diameter was found near Sapporo, and I have many times noticed leaves nearly two feet across. If anything shall be discovered able to withstand the phylloxera or calculated to infuse new disease-resisting vigor into our failing vines, it would seem that we have it here in Yesso. Already French and Swiss wine growers have had their agents on the spot and have taken measures to test this vine.

The cultivated grape of Old Japan is *Vitis vinifera*, and all varieties there grown require more heat than the Yesso summer affords; but in Yesso both American and German varieties have been for a number of years under trial. All sorts common here ten years ago have been extensively tried; but with very indifferent success. With the single exception of the Delaware most fail

to ripen thoroughly at least three years out of four. That variety, somewhat to my surprise, is in the vicinity of Sapporo the freest from disease and altogether the most certain and delicious of all American sorts. German varieties of many kinds are now under trial; but these, like the American, often fail to ripen, and I am confident that the ill-advised attempts at wine-making which have now been in progress some eight or nine years are doomed to disastrous failure. The autumns are too wet and cloudy to perfect the grape, although, as was usually the case, frosts severe enough to injure it hold off until about the 20th of October.

Of that fruit, the Kokuwa (*Actinidia arguta*), which is peculiar to Japan, and which finds its most perfect and abundant development in the primeval forests of Yesso, I presume you have all heard. Much has been written and said about it within the last few years; though, strangely enough from my point of view, it has been urged upon the public attention as an ornamental climber. Now far is it from my wish to detract from its merits as such. It is certainly a vigorous, not to say a rampant, grower and its luxuriant dark green leaves and waving stems have a beauty of their own. For the purpose of covering arbors or "forming wild entanglements," as one writer has expressed it, from tree to tree it is certainly suited. Its effects upon the trees, however, I will not answer for; its coils I fancy will be found to hug "closer than a brother." Still it is a beautiful climber, though I believe that Yesso can furnish several more beautiful and far more manageable; but I would caution not to plant it against verandahs or buildings. Unless looked after far more closely than most will find time for, it will be found to overgrow all desired bounds, to displace eaves spouts and to make itself a nuisance generally by its omnipresence.

It is for its fruit, however, that the plant is mostly prized in Yesso, where in many localities it is abundant and very largely collected. The fruit, which is a berry, runs in size a little larger than the Green Gage plum; the skin is green; the pulp when ripe soft, and the seeds, which are numerous, very fine. The flavor I cannot liken to that of any other fruit; it is very agreeable to most; but it is *sui generis*. There is an astringent principle in the skin, which must not be sucked too much or it will make the lips, tongue, and throat sore. It is not difficult, however, to suck out the pulp without encountering this trouble. The effect of the

fruit is decidedly but pleasantly laxative to most,— much more so than that of any of our fruits, not excepting the imported fig. It must prove a valuable acquisition even for this single quality, were it not moreover sufficiently delicious to repay eating. One attempt only has been made in Yesso to my knowledge to cultivate the fruit; but the plants for this experiment, collected before sufficient acquaintance with the botanical peculiarities of the species had been acquired, all proved barren. The species is polygamo-dicœcious, and for fruit it must be propagated by cuttings from fertile plants. A second obstacle to its culture is the fact that a number of years must elapse ere the plant begins to be productive. Just how many would, however, be required from cuttings I am not prepared to say. Should the fruit under cultivation prove as good as when wild it would be well worth a place in our gardens; and of course there exists a possibility that it may be improved. It flourishes best in rich moist soils.

A fruit which, from the extent to which it is collected and used in Yesso, perhaps deserves mention next, is that of the rose (*Rosa rugosa*) called by the Japanese "beach pear." It is so called, doubtless, from the fact that it is especially abundant on the upper reaches of sandy beaches. The hip of this species of rose, as many of you may know, is unusually large and handsome. In size, it averages larger than the common crab-apple, and the color is a deep scarlet. It is chiefly eaten by the children; though halved, seeded, and slightly salted, it is esteemed a delicacy by many adults. I have tasted it and found it really not so bad as I had expected. Its ornamental qualities are not lost sight of by the Japanese, who have fixed upon a special holiday in July when it is considered eminently the thing both to display this fruit and to partake of it.

A species of apple (*Pyrus Toringo*) is common all over Yesso. In rich lands the trees average about as large as crab-apple trees here; in poor sandy soils it is reduced to a shrub. The fruit is small; it will hardly average as large as the cranberry. The stem is long and slender, the shape that of our apple, and it is puckery and very sour. This species has been commonly used as a stock for grafting our American varieties and answers the purpose excellently. The trees begin bearing at the age of about four years, and trees which began to produce fruit abundantly about 1879, were still producing large crops of fine fruit annually, where

well cared for, ten years later. At that time, where trees were planted twenty by twenty-five feet apart, the branches were beginning to meet, and the trees were still very thrifty. It is yet too early to say how long lived such trees will prove.

Most American varieties of apple succeeded well in Yesso; but all are considerably later than here. Fall varieties keep into February and our common winter sorts till August. Our very best keepers, like the Roxbury Russet, are worthless there. They do not become sufficiently mature to ripen, but, put into the cellar, simply shrivel up and soon rot. The splendid Greenings which I have eaten there in July would, however, surprise you. The apple fruit is mostly free from insect enemies in Yesso, though a species of curculio has in some places proved injurious, and a small worm does occasional damage. The worms which attack the leaves are, however, legion, and among them is our own latest acquisition in that line,— the Gypsy Moth (*Ocneria dispar*).

You may be surprised to learn that our apples and pears both having been introduced and having begun to bear at about the same time, the Japanese almost to a man esteemed the apple the more delicious. For many years the prices were, for apples ten to twelve cents and for pears three to five cents per pound; and after the lapse of about ten years, in 1888, the prices were in about the same proportion, viz.:— apples from six to eight cents and pears from two to three cents per pound.

American pears succeed well in Yesso with the exception of the late sorts, like the Vicar, which is worthless. All are later and keep better than here; I usually kept the Anjou without trouble until well into March. For the pear the native *Pyrus Toringo* already spoken of was commonly used as a stock; the Japan Quince (*Pyrus Cydonia*), is also somewhat employed. There is no pear native to Yesso, but the earlier varieties of the pear commonly cultivated in Southern Japan (*Pyrus communis*) are raised to a limited extent. This is a fruit of magnificent appearance, large, obtuse, russet in color. In texture it is hard or breaking and coarse; in flavor sweet and insipid. A friend of mine said that once, in company, he likened these pears to "turnips in disguise;" but the company unanimously disapproved the comparison. They thought it was unfair to the turnip. Still as a Japanese friend of mine once expressed it, "There is plenty of *teething* in these pears;" and this, doubtless is the great reason

for the universal taste for them among the people. If you will believe me even educated Japanese persisted that they liked our pears best while they were yet of flinty hardness,— before, to my taste, the flavor was at all developed. You will not longer wonder that the apple was generally preferred to such fruit; but for the sake of the reputation of our pears you will be glad to know that the Japanese are slowly learning better when to eat them.

An indigenous plum — probably *Prunus tomentosa* — is of some value. The fruit is small and purple, and hardly suited for eating, but it makes excellent preserves. The stones are collected in large quantities and the young trees used for budding with American sorts, which do well in Yesso.

The wild mulberry — *Morus alba*, I think, but of the species I do not feel entirely sure,—is nearly everywhere abundant in Yesso. The leaf is much collected and used for feeding silk, worms: and this species, which is perfectly hardy (while the Chinese variety is not), is extensively propagated and planted for the same purpose. The fruit is rather small, black, and very delicious in flavor; but it is not much used by the natives.

In some parts of Yesso there is found a wild currant (*Ribes Japonica*) the fruit of which I have never seen. It is said to be red; but is not used so far as I know. The racemes of flowers which I have seen are of remarkable length; in the dried specimens which I have here, the longest is fully seven inches in length. Should it be found possible to cross this species with our own, it would seem not unlikely that considerable improvement in this direction might be the result. In Yesso, unfortunately, a very large proportion of the fruit of this currant always blasted while very small. I have successfully imported this species and now have it alive in Amherst.

Although not fruits in the ordinary sense of the word, I want to allude to the Yesso hop and asparagus (*Humulus Japonicus* and *Asparagus officinalis*), both exceedingly abundant in many places; and both, I should think, promising, as a result of variation which usually follows the cultivation of wild species, to produce varieties of value. In connection with asparagus should be mentioned also the Japanese Udo (*Aralia cordata*), the spring shoots of which are used as we use those of that plant. This is also everywhere common in the rich woods of Yesso; it is also cultivated to some extent and is said to be really delicious.

The cultivation of both the American and the old Japanese varieties of the peach has been attempted in Yesso; but, as already indicated, with very poor success on account of the winter-killing, not of the fruit buds merely, but of the tree itself. The Japanese are not familiar with budding and, in Yesso at least, propagate wholly from the stones. The old native sorts produce a very inferior fruit.

A kind of apricot is somewhat cultivated in Yesso. The tree seems to be perfectly hardy and enormously productive; but the fruit is small and inferior. There, at least, it is propagated wholly from the stones, and so far as I am aware there is but one variety.

Our varieties of cherries have been tried; but though the Japanese esteem the fruit as very delicious, and now, after the lapse of fifteen years since its introduction, it still never retails for less than twenty cents per pound, it is certainly very inferior to the fruit as commonly produced here.

With brief mention of one other Yesso fruit, I will leave this branch of my subject and pass on to consider some of the flowers of Yesso. This is the peculiar fruit of a species of conifer (*Cephalotaxus drupacea*) which grows as an undershrub in many of the mountain forests. This shrub is sometimes as much as eight or nine feet in height but usually rather less; and the female plants bear a stone fruit precisely like a plum in structure. It is of about the size of the common pecan nut; the flesh is proportionally about as thick as that of the plum and is very juicy and remarkably sweet with a faint suggestion of the pine in its flavor. Really at present of no practical importance, it has actually seemed to me, as I have often jokingly said, that this fruit affords a rare field for the quack-medicine man. A rich natural syrup, with the flavor of the pine — what a chance for the production of a specific for throat troubles, coughs, and consumption! And then it comes from Japan — that magic land whence come — of all things — soap, which the Japanese never use, and sovereign remedies for corns, with which their feet are never troubled.

Of the flowers of Yesso I hardly know how to speak. In preparation for writing this paper I looked through my collection of dried specimens, with the intention of picking out a few of the most attractive, and I find I have selected no less than sixty-four as worthy at least of mention. Now do not be alarmed—I am not

going to detain you so long as this number would imply. I have decided that I must have looked with prejudiced eyes; and, while I have brought them all and shall be pleased to show and talk about them if any are interested, and shall even append a list, I have decided to speak formally of as few as possible and of those as briefly as I can.

In speaking of them I shall follow no definite rule of order. From memory simply, I have thrown those of similar characteristics together; and shall not, therefore, follow any exact systematic arrangement.

One of the most attractive of the very early wild flowers of Yesso is the *Adonis Amurensis*, a bright yellow flower which might appropriately, in that country, be called the "eye of spring," for it peeps up sometimes even in February on sunny banks where the snow has melted away. Often have I seen it looking bravely up in the midst of a sharp snow-storm, and so hardy is it that such exposure scarcely seems to hurt it. It is a special favorite with the Japanese, who, however, seldom plant it in gardens; but are satisfied with seeking out the earliest plants and digging them while in bud for forwarding in old tin cans, broken teapots, and the like. Regular markets as well as special booths usually offer such roots for sale in large quantities, and everyone who cannot dig for himself buys this which is the earliest harbinger of spring for the masses.

More delicately beautiful is the *Glaucidium palmatum*, a mid-spring flower, with large and particularly beautiful almost translucent leaves and large delicate single pink flowers. This is the favorite of cool, shady dells and rich, moist soil. A horticultural friend of mine, writing a few years since, said that this very beautiful flower had not then been introduced into Europe and America. It would richly repay care, but would undoubtedly be fastidious as to soil and surroundings.

The gorgeous beauty of the autumn woods, the monkshood (*Aconitum Fisheri*), standing often fully six feet high, with enormous masses of brilliant blue flowers, is another of the Ranunculaceæ which must not be forgotten. It is of peculiar interest, both from its beauty and from the fact that the aborigines of Yesso extract a poisonous principle, aconite, from its root, using it to poison the tips of arrows which they employ in setting traps for bears.

Two other species of aconite are found in the Yesso forests; but both are less beautiful and less common than the one of which I have spoken.

By far the most delicately beautiful of spring flowers in the vicinity of Sapporo is the *Corydalis ambigua*, with its fragile stems and leaves, and its lovely racemes of flowers, shading into the most exquisite tints and hues of blue and ultramarine and pink, and sometimes becoming almost white. The fragrance too of the flowers is wonderfully delicate and sweet. I should think this species and its rarer form with the lobes of the leaves linear might be cultivated quite easily, and if so they would amply repay the care bestowed upon them. The far more sturdy and quite different *Corydalis aurea* has also great beauty of its own. Both thrive in moderately light soils.

The Japanese primrose (*Primula Japonica*), is everywhere common along the banks of streams and must not be forgotten. It is, however, I believe, well known to European and American gardeners, and is justly esteemed for its elegant habit and great beauty of flower.

I wish next to call your attention to the Yesso Spiræas, of which there are a large number of species, several of which are of unusual beauty. I would mention as especially worthy of attention the species *aruncus*, *callosa*, and *sorbifolia*—widely different each from the other, but any one of which would form beautiful clumps in a garden or add grace and beauty to a bouquet.

I must not forget here the flower known to the Japanese as *hagi* — a species of Lespedeza, with pinkish flowers — which is celebrated in Japanese story and song, and is regarded as one of the eight beautiful wild flowers of autumn. Two others which are included by the Japanese in the same class stand next in my list,— *Patrinia scabiosæfolia* and *Platycodon grandiflorum*. These are almost invariably found together in open sandy localities; and a beautiful combination they make either in field or bouquet — the Patrinia with its broad cymes of pale gold and the Platycodon with its large bells of heaven's own deep blue. You are wondering what are the other flowers which make up the magic number, and as these, with one exception, are also found wild in Yesso I may mention them. They are the grass pink, the morning glory, a grass which has beautiful autumn plumes (*Eulalia Japonica*), the aster, and the wistaria. The latter I have never seen wild in Yesso.

The dog-tooth violet (*Erythronium Dens-canis*), with unusually large and finely mottled leaves and large pink flowers, is a woodland beauty which grows in many places in extraordinary profusion; and excelling even this in abundance is the sweet lily-of-the-valley (*Convallaria majalis*), of which I have seen dozens of acres in one lot. This attains to great size and beauty here; and so well do soil and climate seem to suit it that in places it takes possession of the ground to the almost entire exclusion of other plants. It makes itself a great nuisance in pastures; and during my stay in Japan I was more than once consulted as to means of exterminating it, or asked whether some practical use could not be made of it. The beauty and the fragrance of such pastures, however, you can imagine.

A beautiful dark purple (the Japanese say black) lily (*Fritillaria Kamchatensis*) is rather rarely found, and it never fails to excite the liveliest feelings of admiration. I have known a Japanese to carry a bulb in bud or flower more than one hundred miles on horseback to plant it in his garden. I have myself also tried to transplant it; but without success. It thrives in cool and shady localities; and would certainly be highly appreciated should it do well under cultivation.

One other wild Yesso lily I must mention for it is of surpassing grace and beauty. I christened it the "fairy-lily." It is the *Lilium medeoloides* of Gray. It produces a very large whorl of leaves a short distance below the flower, which peculiarity causes the Japanese to call it the "wheel-lily." Good specimens produce as many as a dozen of the most dainty lilies I have ever seen. The general color of the perianth is orange, and its divisions are very much reflexed.

Of one other herbaceous species only will I speak, and from that will pass on to notice a very few of the ornamental woody species. This is the striking *Lysichiton Kamchatense* of the Yesso marshes, producing in earliest spring a white flower like a large calla, and, later, enormous leaves of great beauty. In grounds of sufficient extent to afford it a suitable habitat, this must prove a decided acquisition both for its flowers and foliage, which last has a decidedly tropical appearance.

Among woody plants the magnolias have been mentioned. Both form handsome trees of medium size. The points which would, perhaps, make them desirable here are hardiness and the great fragrance of the flowers. The species *hypoleuca* is also

particularly handsome in leaf, flower, and fruit. The flowers frequently measure more than a foot across, and the odor is such that I often recognized the vicinity of trees in bloom while yet as much as a furlong distant.

Cornus brachypoda, a small tree, is particularly brilliant in fruit, with its wealth of scarlet drupes which persist well into the winter. There are several beautiful Viburnums; but these, perhaps, do not surpass ours. Among the Hydrangeas, however, are found a number of noticeable species. The one which will prove the most decided acquisition is *H. petiolaris*, also called *Schizophragma hydrangeoides*. This is a climber which in Yesso goes to the top of the tallest trees, to which it clings by root-like bodies. When in bloom it converts the tree trunks into pillars of snow; and a ride in June through miles of primeval forest where almost every other tree trunk and every old, gray stump is converted into a mass of beautiful white bloom is an experience to be remembered. The Japanese know this plant as "snow vine" and the name is well given. The neutral flowers are abundant and persist all winter, so that this hydrangea is practically always beautiful.

Hydrangea paniculata, a large shrub, produces white flower clusters of enormous size; and very delicately beautiful in its native glens is *H. hortensis* or *acuminata* with its pale blue cymes; but the former is not strikingly different from the original of our cultivated forms and the latter probably will not flourish in open gardens or lawns.

Syringa vulgaris is a small tree or shrub, common in Yesso, for the seeds and plants of which there has recently been a large demand both in America and Europe. The tree is not in itself particularly beautiful; and though it produces in profusion large clusters of small white flowers, I do not believe its popularity will be long-lived. It is reported to be fragrant; but, though quite strong, I do not find its odor pleasant.

Nothing in regard to the flowers of Japan would be complete without mention of the cherry; and no land could be home to a Japanese which did not produce that much loved and storied flower. And, indeed, it is exquisitely beautiful in spring-time. The wild cherry of Yesso, single and comparatively small as the flower is, yet lingers a very pleasant picture in memory's eye. Its beautiful bark, its dainty unfolding leaves deeply tinged with red, and its flowers of delicate pink make up a whole upon which the eye loves to linger. I cannot wonder that it has appealed strongly

to the native imagination and still constitutes, as it has for ages, a favorite subject for the poet's pen and the painter's brush.

"No man so callous but he heaves a sigh
"When o'er his head the withered cherry-flowers,
"Come fluttering down.— Who knows? the spring's soft showers
"May be but tears shed by the sorrowing sky."

The native Yesso cherry (*Prunus Pseudo-cerasus*) produces a fruit which is not of the slightest edible value. The tree is of medium size.

Another beautiful tree, rather sparingly found in Yesso forests, is *Styrax obassia*. This is handsome in foliage and produces clusters of exquisite white flowers in midsummer. It would well repay cultivation. *Clerodendron trichotomum* is a beautiful shrub, especially when in fruit, with its handsome contrast of brilliant purple and red. *Eleagnus Japonicus* is another favorite of mine, with its silver foliage in summer and its wealth of scarlet berries in autumn and winter. It is perfectly hardy and easily cultivated. The Japanese eat its fruit freely. It is seedy, but has a rather pleasant acid flavor. A yellow Daphne I always sought out in earliest spring. Its leaves are evergreen, its flowers yellow and very sweet. *Diervilla versicolor*, wild there, I consider even handsomer than the Diervilla common in our gardens. I transplanted this species to my Sapporo garden and found it bore the change well and amply repaid the little care it required.

The *Actinidia polygama*, common everywhere in Yesso, deserves more extended mention. I must first call your attention to the fact, however, that the Kokuwa (*Actinidia arguta*), of which I have already spoken, has been sometimes mistakenly called by this name. The two species are wholly distinct; and the *polygama*, in my opinion, for ornamental purposes is worth far more than the other. Its habit of growth is considerably less vigorous, though it is by no means a slow grower. It will be found far less obtrusive and more manageable; but the chief point in which it excels *arguta* is in the beauty of its foliage. Mature plants have the habit of producing at the ends of the growing shoots some four to six leaves which are tipped with a lustrous silvery white, usually spreading over more than half the leaf. This peculiarity gives it at a little distance, as it clambers over thickets, the appearance of a plant in full and abundant bloom. Then, too, the uncolored foliage is exceedingly beautiful, and the flowers. though partly hidden by the leaves, are very pretty and have all the

fragrance of those of the orange. I moved a number of these climbers to my lawn but the plants were young and after three years the foliage had failed to show any white. Living plants in Amherst last season failed to show it; and I await with interest the determination of the question whether the change in soil, climate and surroundings will cause this species to lose this most valuable peculiarity. The fruit is similar in size and structure to that of the kokuwa, but it is far less abundantly produced and less delicious.

A word about the mistletoe and I am done with the wild flowers of Yesso. This, as I have already pointed out, is abundant. There are two species, one producing red, the other yellowish berries. Both add greatly to the winter beauty of the forests. It is an interesting question to my mind whether these plants would prove hardy here, but from what I know of the climate of the two places I incline to believe they would. Their introduction could not fail to give satisfaction to the owners of parks or ornamental forests.

Of the cultivated flowers of Yesso I need say but little. Much has already been said and written on this subject and better than I could hope to do it. That the Japanese love flowers you are probably all aware. All either collect them from the fields or woods or cultivate them in gardens. Most do both, and select for both with a taste that never fails to charm. Poor indeed is the family — nay more, low down in the social scale — that cannot and does not find at least an old jug for a branch of the pussy-willow, the plum, the cherry, the magnolia, or the brilliant maple— each in its season. And this universal taste and love for flowers is manifested alike in snowy Yesso and in the more sunny south. Yet should one look for the lily, the pæony, the chrysanthemum, the lotus, and the many other flowers for which Japan is famous, each in highest perfection, one must naturally turn to the older parts of the country. These and many other flowers are cultivated in Yesso, but with perhaps a single exception the new country must yield the palm to the old. That exception is the *Iris Kæmpferi*, which in Sapporo reaches a wonderful development. Now for several years, every season has witnessed in Sapporo a display of these marvellous flowers, by a local horticulturist, which in Boston would be the wonder of the town. He numbers his varieties by hundreds, and has perhaps an acre of sunken beds separated only by the narrowest of raised paths. Most of the

plants stand five or six feet in height and bear enormous flowers, a foot and more across and seemingly in every hue and in every possible mixture of all hues. Truly as I have sat and gazed upon the wondrous display I have felt ready to exclaim, "This is the queen of flowers."

With this exception I saw no noteworthy attempts at cultivation of flowers in Yesso. Many were the charming little gardens, usually at the rear of the house, but always commanded by the best rooms. But Japanese gardens would require a lecture by themselves. Believe me, they have a charm all their own. They comprehend much within a limited area. Mountains, waterfall, river, bridges, knotted and gnarled heroes of a thousand storms, with shrubs and flowers, rockwork and appropriate animal life, all within the limits of a few square yards if need be; but all presented in a manner to inspire respect, admiration, and wonder,—such are some of their most striking peculiarities.

I have detained you already over long; if I have succeeded in giving you some faint idea of the floral wealth of the region I have treated of, I am more than satisfied; and appending the list of selected specimens not mentioned I will close:

Adenophora verticillata.
Artemisia (*sp.*?).
Caltha palustris, *var.* Japonicus.
Clematis fusca.
Crawfurdia Japonica.
Funkia (*sp.* ?).
Gentiana (*sp.* ?).
Hydrangea hortensis, *var.* Japonicus.
Lilium cordifolium.
Nymphæa pygmæa.
Pæonia obovata.
Potentilla palustris.
Pueraria Thunbergiana.
Spiræa Kamchatica.
Taraxacum officinalis.
Trillium erectum, *var.* Japonicum.
Trillium (*sp.* ?).
Veratrum album.
Viburnum dilatatum.
" Opulus.
" Wrightii.

Professor Brooks' essay commanded the closest attention of the largest audience ever assembled at one of these meetings, and at the close a vote of thanks for his very able and interesting paper was unanimously passed.

The announcement for the next Saturday was a paper upon "Galls found near Boston," by Miss Cora H. Clarke, of Jamaica Plain.

BUSINESS MEETING.

Saturday, February 1, 1890.

An adjourned meeting of the Society was holden at eleven o'clock, the President, William H. Spooner, in the chair.

The Annual Report of the Committee on Gardens was presented by the Chairman, John G. Barker, and it was *Voted*, That it be referred to the Committee on Publication without reading.

On motion of Mrs. H. L. T. Wolcott, it was *Voted*, That the appropriation of $150 for the Window Gardening Committee be placed in the hands of the Committee without restriction.

The President read a letter from the Worcester County Horticultural Society, communicating the action of that Society in regard to petitioning the General Court for such further legislation as will more effectually protect fruit growers from the depredations of juvenile trespassers and thieves, and asking the coöperation of this Society in the movement. On motion of E. W. Wood, it was

Voted, That a committee of three be appointed to act in conjunction with the Worcester County Horticultural Society in the matter. The Chair appointed as that Committee, Mr. Wood, O. B. Hadwen, and Samuel Hartwell.

Edward F. Atkins, of Belmont,

having been recommended by the Executive Committee for membership in the Society, was upon ballot duly elected.

Adjourned to Saturday, February 8, 1890, at half past eleven o'clock.

MEETING FOR DISCUSSION.

Galls Found Near Boston.

By Miss Cora H. Clarke, of Jamaica Plain.

In the "Encyclopædia Britannica" we find this definition:— "What are commonly known as Galls are vegetable deformities or excrescences, and, according to Lacaze-Duthiers, comprise all abnormal vegetable productions developed on plants by the action of animals, more particularly by insects, whatever may be their form, bulk, or situation." Professor Riley, in his interesting article on the subject in Johnson's Encyclopædia, says that the name should not be applied, as it sometimes is, to those plant swellings and nodosities caused by the punctures of insects which always dwell exposed thereon, the difference between a gall and a mere swelling being that the architect of the former is hidden from view, and that of the latter always exposed.

Fungous growths in plants often produce swellings and monstrosities which might be mistaken for true galls and in some cases are called galls, and some galls much resemble fruits, and those unfamiliar with botany might take them for the fruit of the plant upon which they grow.

The first question that occurs to us on looking at a gall, is "How can the insect make the gall?" The statement was formerly made that the gall was caused by a poison which the mother insect injected into the wound when she laid the egg, and this Dr. Adler has found to be true in regard to the galls produced by saw-flies. He has carefully watched the gall growth of one species, and thus describes it:—

"The Saw-fly (Nematus) with its delicate saw-shaped sting, makes an incision in the tender little leaf of the terminal shoot of *Salix amygdalina*, and shoves its egg into the wound; at the same time, something flows into the wound from a glandular secretion of the saw-fly. A few hours after the egg is laid, the surface of the leaf takes on another appearance, and there begins a new formation of cells, which leads to a limited thickening of the leaf surface; in about two weeks the bean-shaped, greenish red gall is fully grown; if one opens it at this time, the egg still lies in the small central cavity, the development of the embryo

being not yet concluded. After three weeks the larva creeps forth, and finds the nutritious gall material all ready prepared for its food."

A saw-fly larva may be recognized by its large head, and many legs (twenty in all, six true and fourteen false); in some species the larvæ go underground to transform, and others pupate within the gall.

The saw-fly galls which I have found here, are willow eggs, on the twigs of willow trees, and willow peas, willow apples, and willow beans on the leaves. These latter occur in considerable numbers, all through the season, on the leaves of large willow trees, at Manchester, Mass., and I have also found them at Jamaica Plain.

But Dr. Adler found that in the family Cynipidæ, which he calls "gall-wasps," and we, usually, "gall-flies proper," the gall is produced in quite a different way; his observations showed him that the mere puncture of the plant by the gall-fly, and act of laying the egg gave no occasion for gall formation, and that it was not until the tiny larva had crept out of the egg shell, and wounded with its delicate jaws the soft plant tissue surrounding it, that a rapid cell-growth began,— so rapid that while the tail end of the larva was still in the egg shell, in front of his head a wall-like growth of cells arose.

For the formation of the gall, it is essential that the larva, in hatching, should find itself in a layer of fresh young cells, capable of rapid growth and multiplication. Should the mother in any way fail of placing her egg in exactly the right position, the larva must die.

If the egg is laid in a leaf, the gall formation begins in the layer of cells in the under side of the leaf, as the upper surface consists of firm cells which cannot further change. But if the egg is laid in a bud, and the larva in hatching finds one of the undeveloped leaves, this as yet consists of similar cells, which, whether they correspond with the upper or the under surface of the leaf are all capable of development in a similar way, and the gall may appear on both surfaces of the leaf, or cause a deformation of the whole leaf.

But how, from similar cells, galls so different from each other in shape, size, and external appearance can be produced, is a point not understood. The hairs which cover many galls are a

development of the down usually to be found on young oak leaves. Mr. Bassett, of Waterbury, Conn., has discovered that in the woolly gall of *Cynips seminator* on the white oak, the hard kernel answers to the leaf-stalk, and the long wool is an enormous development of the down of the leaf.

These hairs are supposed to be of service to the gall in preventing the attacks of parasites. The liability of galls to the attacks of these parasites often renders it difficult to rear the true gall maker, and the parasites sometimes so closely resembles the true gall makers that one not an entomologist cannot distinguish them.

If, before an oak gall is fully grown, its larva is attacked by a parasite, the gall never assumes its perfect shape, the life of the larva being a necessary factor in its development. But many perfectly formed galls also produce parasites, which I suppose did not attack them till the larva had completed its growth.

Besides being subject to the attacks of these enemies, some galls harbor what are called "guest insects," which live within the gall substance but in no way disturb or incommode the true gall maker.

The larvæ of these oak gall insects, are white, or whitish, with an inconspicuous head and no legs. The body is more or less cylindrical, tapering at each end, and lies in a curved position within the cell. The larvæ change to perfect insects within the cells, and the gall-flies finally emerge, leaving the gall pierced with one or many holes, according as it contained one or many cells.

The perfect gall-flies are usually quite small. But, small as they are, entomologists have put them under their microscopes, and studied their minutest details of structure, and found them to be so different from each other that they have divided them into different genera, and whereas they used to be all called Cynips, now some of them are named Callirhytis, some Neuroterus, others Andricus, Biorhiza, etc.

The ovipositor, or apparatus which the little creature has for piercing the plant tissues and laying its eggs, is quite complicated, and consists of two plates which form a kind of sheath, and a piercer, composed of three pieces, one stout and deeply grooved longitudinally, and two others, which are hair-like, and work within this channel, beyond which they can be protruded when in use.

When the insect wishes to deposit her eggs, she, if it be a bud which she selects, settles upon it, and having carefully examined it with her antennæ, passes her ovipositor under one of the scales, and thrusts it, working the hair-like organs up and down like saws, into the bud, until the position is reached which she wishes her eggs to occupy. This operation seems to require great exertion on the part of the insect. She then withdraws her ovipositor, deposits an egg at the entrance, and pushes it to the bottom.

The insects which produce the Bedeguar galls were watched while egg laying, and some of them spent more than twenty-four hours in oviposition, yet in spite of all this care some of the galls failed to develop.

In some species it takes the egg a long time to hatch. Dr. Adler found that in one species the eggs were laid the end of May, and not until September did the larvæ emerge from the egg, and begin gall formation. With another species, the eggs are laid in October, and the galls first form in May.

Mr. Bassett tells us that in this country at least two hundred different kinds of hymenopterous gall makers have been found, and he thinks that probably as many more remain to be discovered. He has himself described eighty or more species, and has fifty kinds of galls from which no flies have been reared. I have found forty kinds upon oaks, of which six are not named, and eighteen upon other plants, mostly Rosaceæ, of which four or five are not named.

Dr. Adler thinks that the gnat galls must be produced by the action of the larvæ, because the parent has no sting, and can only shove the egg into an opening bud with its extended ovipositor.

These gall-gnats are cousins to mosquitoes, and somewhat resemble them; they belong to the order of Diptera, family Cecidomyiadæ. They do not confine their attentions to two or three families of plants, as do the Cynipidæ, but produce galls upon members of almost all the families of flowering plants; each species, however, confines itself to one, or to a few allied species of plants.

I have found their galls upon St. John's-wort, clover, rose, spiræa, various composites, shad-bushes, linden, aspen, willows, hickories, oaks, and in the fruit of a sedge,— about forty kinds in all. They are especially fond of willows, hickories, composites, and rosaceous plants; one kind may be found living in lumps of pitch on the twigs of pines, though these can hardly be called galls.

The gnat larvæ, when first hatched, are colorless, but later they become yellow, orange, or red. They are usually flattened, with an inconspicuous head, and no legs; some of them go underground to transform, and some change within the gall; in the latter case, one can often see the white pupa skin protruding from the gall, after the perfect insect has flown away. Sometimes several larvæ inhabit one gall.

The deformations which they produce on plants are numerous and varied,— sometimes being little more than a spot on a leaf, like those which have so injured the foliage of our tulip trees this summer; sometimes a lenticular thickening around the larva,—a swelling in a twig, leaf-stalk, or midrib,— a folding over of the edge of a leaf,— a plaiting up into a crested ridge,— or a regular gall, attached to the leaf only by a small portion of its surface.

Plant lice, like the green flies of our greenhouses, form galls on elms, witch-hazel, and other plants. Sixteen different kinds have been found on the hickory, made by Phylloxera.

The formation of the cock's-comb elm gall is thus described by Professor Riley:

"The eggs are found on the bark of the tree, and the young hatch about the time that the leaves unfold, and crawl nimbly over the tree till they come to a young leaf, when they settle on the under side, and begin to fret the leaf-surface with their long beaks. The galls show at first as slight elongated ridges on the upper surface, with corresponding closed depressions on the lower; upon drawing apart the lips of the wrinkle beneath, the louse is seen constantly running back and forth in the cavity, and inflicting rapid punctures with her beak, the inner surface of her dwelling being smooth and glossy, with a slight blistered appearance, in contrast with the normal more rough and pubescent texture of the under surface of the leaf. In about two weeks the gall is fully developed and young lice begin to appear in it, and in two or three weeks more it becomes crowded with them; they are quite active within the gall, exploring its cavities and obtaining their nourishment through its walls; they finally issue from a slit on the lower surface of the leaf, which opens for their exit about the time they become fledged." This brood has not been found to produce galls.

At Magnolia, I have found the "bead-like poplar gall" quite abundant on leaves of the Balm-of-Gilead poplar. They form a

series of swellings as large as small beans, along the edges of the leaf. A large hemispherical gall at the base of each leaf, is sometimes quite abundant; I have often found them torn open, and empty. Probably this may have been done by birds to get at the lice, or by squirrels, as the red squirrel has been seen to feed upon lice in a leaf-stalk gall of the poplar.

Our Norway spruces suffer from the attacks of an aphis, the fresh galls of which, green or rosy, and not unlike small cones, appear towards the end of May. They open with little mouths, to let the green flies escape, and in winter the woody, dead galls may be found. In all, I have found about twelve species of aphis galls, five or six of which, made by Phylloxera, were upon the hickory.

A few galls are made by little moths, which resemble the destructive little creatures that injure our clothing. One of the commonest of these moth galls is to be found upon the stalks of golden-rod, but at this season they are empty, the moths having come out in the fall.

I have also found a gall, said to be made by a moth larva, upon the leaf stalks of *Populus grandidentata* near the Mount Hope railroad station. This gall, which is the size and shape of a small pea, is very common on aspens at Magnolia, and the larvæ go underground about the first of October to transform. I have not yet succeeded in rearing them.

A few galls are made by beetles. One species causes the grape vine wound gall, and another the raspberry gouty gall. This latter has been found in Dedham.

Small galls are produced on the leaves of many plants by mites (Phytopi),— microscopic creatures allied to spiders. Their galls differ from insect galls in having an opening below, which is frequently lined with hairs. The irritation caused by the gall mites in feeding upon one spot on the leaf, causes there an abnormal multiplication of the leaf-cells, and an arching up of the leaf surface, which in some species is produced into a roundish, and in others into a spindle-shaped gall.

Some of these mites never produce galls, but their pasturing upon the leaves causes an abnormal growth of hairs, called *Erineum*. The insects live and breed in this growth, as they do in the galls. I have found about seven species of galls produced by mites, and many kinds of Erineum.

I wish particularly to call attention to a certain point in the history of our oak gall insects which offers a wide field for investigation and discovery.

When Dr. Adler was pursuing his investigations with regard to the growth of galls of Cynipidæ, he made the startling discovery that the insect which came from a gall did not resemble the one that made the gall, and the gall that it made did not resemble the gall that it came from. That is, each gall insect resembled its grandparents and not its parents, and the gall that it produced resembled those produced by its grandparents. So unlike was the gall-fly to its parent, that they had been described as belonging to different genera. He thus reduced thirty-eight species to nineteen, and found only four species where this alternation of forms did not occur. Male and female gall-flies will occur in one brood, while in the succeeding brood females only are to be found.

There is no reason why the oak galls of this country should not show similar phenomena, and indeed this has been found the case with certain species observed by Mr. Bassett. One afternoon in 1864, visiting a thicket of shrub-oaks (*Quercus ilicifolia*), Mr. Bassett found hundreds of the gall flies which come from the woolly "operator" galls of the same plant, ovipositing between the cups of the young acorn and the little acorns themselves, and later in the season, he found that the galls which were produced resembled seeds or kernels of corn, projecting somewhat from the cup. Mr. Bassett has also discovered an alternation of forms in the galls of *Cynips noxiosa*, on *Quercus bicolor*, which form large, woody, terminal or sub-terminal swellings on the twigs of this oak. These galls develop in summer, and the insects, which are all females, live in the galls over winter, coming out before the leaves appear in the spring; when the leaves appear a gall grows on them, which is an enormous development of the midrib of the leaf, often to the extent of an inch in diameter, and an inch and a half in length. The gall-flies come out about the 20th of June; long observation has convinced Mr. Bassett that the insects which come from one of these galls produce the other gall.

In the last number of "Psyche," Mr. Bassett describes a recent discovery which he has made:

"One of our most common gall insects here in Connecticut is *Callirhytis futilis*, O.-S. The galls appear in early summer in great numbers on the leaves of *Quercus alba;* they are in the

form of conical blotches, projecting from both surfaces of the leaf, but are more prominent on the upper surface, and are about one-fourth of an inch in diameter. Each gall produces three or four small gall-flies which emerge about the first of July, and soon disappear; where they went to, nobody knew or seemed to know, till I found out their secret last spring. Before the leaves appeared, I visited a thicket of young oaks, where I had found these galls very abundant in past years, hoping to find their progenitor, whoever she might be, ovipositing in the buds of these oaks,— but I was too early; she had not begun her work. But where was she napping at the time? The question was not by any means a new one to me. The soft, sandy loam at the roots of a clump of oak bushes yielded to my fingers, and I soon had one of the main roots laid bare. Judge of the joyful surprise it gave me to find the bark of this root a solid mass of blister-like swellings."

In these swellings Mr. Bassett found minute larvæ, and others evidently a year older than the first ones, but not old enough to produce the gall-flies, and yet on putting the roots in sand under glass, in a few days he reared perfect gall-flies, identical with those he saw ovipositing on the low, white oak bushes, and, marking the trees and twigs, he found that when the leaves were fully grown, they bore *futilis* galls in abundance, but no other species. So the connection between the root galls and the *futilis* leaf galls was proved.

Mr. Bassett's discoveries are the result of observations made in the field, but those of Dr. Adler were from experiments on young oak trees grown in pots. Each pot bore its number, and each pot served for the researches on a single species. After gall-flies had been brought to the trees, they were guarded until they began to sting the buds; in order that they should not escape, or another gall-fly lay on the same tree, a cover was placed over them; at first Dr. Adler used glass receptacles, but he was incommoded by the moisture which gathered on the glass, and hindered observation of the gall-fly, and then he used covers that were partly glass and partly gauze. The four to six year old trees suited him best, and only those which had well-developed buds were available. But of course these little oaks cannot serve for experiments on species which only lay their eggs in blossom buds; these must be observed with all possible care in the open

air. It was in 1877 that Dr. Adler published the results of his experiments.

I have myself endeavored to experiment on little trees of *Quercus alba*, *Quercus bicolor*, and *Quercus rubra*, given me by Mr. Dawson. I placed galls, whose flies were just ready to escape, about the trees, and covered each tree with muslin, and put them by an open window, where they could have fresh air, and where I could watch them easily; but the little flies sat quietly upon the muslin, and did not appear to take the slightest interest in the oak trees. Finally they all died or disappeared, and no galls were ever produced upon the little trees. This may have been because the leaf buds were not in exactly the right condition, because they wanted blossom buds, or for some other mysterious reason.

Mr. Bassett says that where an oak tree or shrub abounds with any given species, we may be sure that the other form also breeds there, either on root, trunk, limb, or in bud, leaf, flower, or fruit, and with this certainty established we ought to be able to find them in every case.

These discoveries have a practical bearing. Should any galls occur in such numbers as to be injurious to our oak trees, we can fight them much better if we are acquainted with them in both their forms than if we can only attack them in one.

To those who wish to pursue the subject, Miss Clarke recommended the account of Dr. Adler's discoveries from which she had quoted. Its title is "Ueber die Generationswechsel der Eichengal-Wespen." It appeared in the "Zeichschrift für wissenschaftliche Zoölogie," Feb. 7, 1881. Also the article by Charles V. Riley, in "Johnson's Encyclopædia," on "Galls and Gall Insects;" "Galls and their Architects," by Benjamin D. Walsh in the "American Entomologist," Vols. 1 and 2, 1868, 1870, and various other articles by Walsh, Riley, Osten-Sacken, Fitch, and Bassett.

The lecture was illustrated by specimens and photographs of many varieties of galls, and the large audience paid most interested attention to all. At the close of the reading, a vote of thanks to the essayist was unanimously passed.

Discussion.

Mrs. H. L. T. Wolcott expressed a strong interest in the subject of the essay and added that she was so fortunate as to have seen the raspberry gall which, as yet, Miss Clarke had not seen. Owing to the fact that her little granddaughter was much frightened upon her first acquaintance with insects, Mrs. Wolcott strove to overcome that fear by interesting the child in the curious nature and habits of that class of animals, telling her little stories about them. She taught the little one that galls were the homes of insects. The young eyes were quick to discover them and then would be heard the cry, "There's a bug's house." In her efforts to instruct this child, Mrs. Wolcott found a lively interest in insect life developed in herself. She spoke of the seeming trustfulness manifested, when the insect has laid its eggs, by leaving them to fate, as if imbued with faith that the Power which made it, would take care of its progeny. She thought the next step in the study of galls must be to find out whether the work of these insects is injurious to the farmer or gardener, and, if so, to learn how to prevent their depredations. It is the province of scholars to discover the habits of the insects causing the galls, but it is left for the scientific farmer — the intelligent tiller of the soil — to prevent or counteract the mischief they may cause.

Mrs. Edna D. Cheney said that she attended the school of the late William B. Fowle, until she was thirteen years old. She remembered with much interest the object-lessons in natural history, which, anticipating so-called modern methods, he was accustomed to give to his pupils. On one occasion he exhibited some oak-apples, as the swellings on the leaves were called, and hazarded the suggestion that they were caused by insects. The great progress made since that time in the knowledge of insect life and habits, through systematic study of this science, is shown by the paper read here today. It shows how much can be done by steadily pursuing the study of one special subject. The fascinating interest inspired by the pursuit, is one of the delights of the study of any branch of natural history.

O. B. Hadwen, Chairman of the Committee on Publication and Discussion, announced for the next Saturday, a paper on "Chrysanthemums," by W. A. Manda, Short Hills, N. J.

BUSINESS MEETING.

SATURDAY, February 8, 1890.

An adjourned meeting of the Society was holden at half past eleven o'clock, the President, William H. Spooner in the Chair.

E. W. Wood presented the following vote :—

Voted, That the Massachusetts Horticultural Society, recognizing the danger threatening the agricultural interests of the State by the sudden appearance, in the town of Medford, of a dangerous insect pest, petition the Legislature, in support of the citizens of Medford and adjacent towns, for State aid in stamping it out.

The vote was unanimously adopted and signed by many members of the Society to be presented to the Legislature as a petition.

Adjourned to Saturday, February 15, 1890, at half past eleven o'clock.

MEETING FOR DISCUSSION.

CHRYSANTHEMUMS.

By W. A. MANDA, Short Hills, N. J.

[Mr. Manda being unable to be present, his essay was read by the Secretary, as follows:]

These deservedly popular plants have been brought to such a state of perfection that in their season they command the sole attention of the flower-loving public, when grand exhibitions are given where these plants are the chief or, indeed, the only attraction.

Many prominent horticulturists have devoted their whole lives to the improvement of this Queen of Autumn in this country as well as in Europe, without speaking of its native home, Japan, where it is most carefully cultivated and esteemed as a national flower and Japanese emblem.

The history of Chrysanthemums dates back many years, the centennial anniversary of its introduction to Europe, having been celebrated there last year; but long before that time it was cultivated in Japan.

The genus Chrysanthemum comprises nearly one hundred species. The one from which all the present varieties have been derived is supposed to be the *Chrysanthemum Indicum*, a rather inconspicuous, single, yellow flower. Through the zeal of indefatigable horticulturists, this flower has by degrees attained almost the zenith of perfection.

The Chrysanthemums at present in cultivation are divided into several classes, namely, the Chinese, Japanese, Anemone and Pompons. Each class is again subdivided into several others; thus we have the Chinese Incurved, Chinese Reflexed, the Japanese Incurved and Reflexed, Japanese Anemone, Pompon Anemone, and so on. Lately the hybrid varieties produced by intercrossing different types have brought forms that are hard to class in any particular group. The aim of the raiser nowadays is to produce large flowering varieties; the substance, color, stem, and habit of the plant seem to be secondary considerations. It is especially noticeable that while hundreds upon hundreds of new Japanese varieties have been raised every year, very few of the Chinese class have been added, while the Pompons are discarded and rarely seen.

When hybridizing, the principal object should be to improve upon the vigor and color of present varieties rather than the mere size. A first class chrysanthemum should be of free growth with stiff stems; the foliage clean and furnishing the stems up to the flower, while the flower itself should be of a good substance, well formed and of a pleasing color. The colors that are yet to be obtained,— aside from the impossible blue, which I never expect to see,— are a fine, clear orange and a clear, bright red, two colors that are needed to brighten up our collections.

A great number of the leading varieties of chrysanthemums have been from time to time imported from Japan, and when the hairy variety, Mrs. Alpheus Hardy, made its appearance, it raised a sensation amongst chrysanthemum lovers; and we hope that this variety may be a parent of quite a distinct class, although the seedlings raised from it have not yet produced any that were furnished with the glandular hairs which give to it its peculiar beauty. The majority of the chrysanthemums at present in cultivation have been raised in Europe and, of late years, in America. Our country has begun late, but it has made up for the time lost, and at present the most valuable and esteemed varieties grown

are American raised kinds. The pioneers in this field were Dr. Walcott, John Thorpe, W. K. Harris, and Arthur H. Fewkes, and lately there are quite a number of amateurs and florists who are raising new varieties every year.

A new variety should never be judged with any definiteness the first year, and should be generally grown two seasons before it can be considered well tested. Thus some of the most promising varieties have proved total failures the second year, while on the other hand, many that have been condemned the first year have proved valuable acquisitions when tried another season.

The hybridizing or cross fertilizing of chrysanthemums is a very uncertain work as regards results, owing to the mass of florets which are gathered in one single head. It is very hard to tell whether a floret has been fertilized with its own pollen, or cross fertilized with the pollen of another variety of the same class but different color through the agency of insects, especially bees, before the hand of the horticulturist has tried his own work on it; and it is for that reason that no raiser of chrysanthemums can say with any degree of certainty that any variety is a cross between such and such varieties, except when kept separate from all other varieties of the collection.

In regard to the results it is also very misleading; the colors of the supposed parents are sometimes never reproduced and if you raise as many as fifty seedlings from the same head of flower, you may get all other colors, but none like the two parents.

In point of vigor of growth, chrysanthemums vary considerably in the various sections of the country as well as in different seasons. Thus many of the varieties cultivated in England for exhibition cannot be grown here with any success, and *vice versa*; while last year being exceptionally wet none of the chrysanthemums planted out of doors did as well as usual. As to the various sections of this country, we find that the finest chrysanthemums in America are grown in and around Philadelphia.

Some varieties also require different treatment from others; Mrs. Alpheus Hardy, Crimson King, Belle Paule, and others, are very partial to excessive moisture. The same applies to pinching; some varieties, such as Grandiflora and others, if pinched late will not produce any flowers at all.

The culture of chrysanthemums is very simple when the cardinal points are well observed, namely, selecting strong, soft shoots for cuttings, and, as soon as they are rooted, never allowing them to

suffer from want of either root room or water, and after the buds are set to encourage with liquid manure. After the plants have done flowering they should be cut down to about a foot from the ground and put in the cool house or a well-ventilated frame.

In January the offshoots from below the ground, and also from the stems or branches, will be from four to six inches long, when they should be cut and planted in sand, either in pots, boxes, or the propagating bench; a south aspect, and temperature not above 55° by artificial heat, are very essential. As soon as the cuttings have rooted, they should be potted into two inch pots; from these they should be repotted in three weeks into three or four inch pots, and again, when well rooted, into five or six inch pots, by which time the first pinching takes place. When the plants are well established in the five or six inch pots, they should be planted in their final quarters; if in pots, those of from ten to twelve inches are large enough to grow the best plants; if in benches or boxes, four inches of depth will suffice for the roots. Then comes the fixing of the plant to a neat stake, and tying it firmly; meanwhile, pinching and pruning should not be neglected. The last pinching is done at the end of July, and the ground shoots are not allowed to grow, in order that the whole strength should go into the main stem. When the buds are well set, liquid manure should be freely given, and attention should be paid to the disbudding, as by leaving one bud to each twig you will have finer flowers than if all were allowed to remain, and the plants will also look better with fifty perfect blooms than with a hundred imperfect ones. Where large specimen flowers are desired, not more than from four to six flowers should be left on each plant, that this very limited number may have the benefit of the whole vigor of the plant. When standard plants are desired the best way is to secure a strong shoot early in January, and leave it growing, without stopping, until it reaches the required height, when it should be pinched and treated in the same way as a bush plant. Planting out, and potting in August, may be practical, yet plants will suffer more or less by being lifted.

The place where chrysanthemums are grown should have all the light, air, and sun from the time the cuttings are rooted until the cuttings are again ready to be taken. The soil that these plants seem to prefer is good turfy loam, well mixed with clay, and enriched by ground bone, sheep manure, or other manure or fertilizer.

Looking over the thousands of varieties named in catalogues, we find that a great many are not grown at all, while others could be dispensed with, and only those possessing the best qualities and distinctness of character should be kept. Among the best old sorts we may count:

Alfred Salter, lilac pink.
Brazen Shield, bronze color.
Bronze Queen of England, bronzy yellow.
Frank Wilcox, golden amber.
Golden Queen of England, yellow.
Helen of Troy, deep rose.
Hero of Stoke Newington, pink.
Jardin des Plantes, golden yellow.
Jeanne d'Arc, blush white.
Lord Wolseley, bronze red.
Miss Mary Morgan, pink.
Prince Alfred, rose carmine.
Venus, pink.
Virginalis, white.

All the above are incurved.

Among the multitude of Japanese varieties, those found to give the best results are:

Admiration, lilac.
Bend d'or, golden yellow.
Bras Rouge, dark crimson.
Ceres, white.
Comte de Germiny, nankeen yellow.
Duchess, deep red.
Edward Audiguier, crimson maroon.
Edwin Molyneux, rich chestnut crimson, golden reverse.
Elaine, white.
Fantaska, coppery maroon.
Gloriosum, yellow.
Grandiflorum, yellow.
Joseph Collins, coppery bronze.
John Thorpe, deep lake.
Marvel, white, shaded.
Mr. Henry Cannell, deep yellow.
Mrs. H. Waterer, white.

Mrs. F. Thompson, white purple.
Mrs. George Bullock, white.
Newport, rose.
Pelican, white.
Peter the Great, lemon yellow.
Robert Bottomly, white.
Robert Craig, pink.
Sadie Martinot, yellow.
Stars and Stripes, carmine.
Superbe Flore, carmine rose.
Thomas S. Ware, rose.
Val d'Andorre, coppery bronze.
Wick Fils, deep red.

The reflexed chrysanthemums are not so numerous but contain such varieties as:

Cullingfordii, brilliant crimson.
Golden Christine, light yellow.
Phœbus, yellow.
President Hyde, rich yellow.
Sam Sloan, pale blush.

As the best Anemones, we may class:

Bessie Pitcher, deep rose.
Madame Cabrol, white.
Princess, delicate lilac.
Thorpe, Jr., rich pure yellow.

Those of late years' introduction, that have proved superior to the already long list are:

Adirondack, white.
Advance, pink.
Alaska, pearly white.
Avalanche, white.
Belle Hickey, white.
Belle Poitevine, white.
Capucine, vermilion.
Colossal, pearly white.
Edwin H. Fitler, yellow.
Excellent, rose.

Kioto, yellow.
La Fortune, yellow.
L. B. Dana, red.
L. Canning, white.
Lillian B. Bird, shrimp pink.
Mme. Louise LeRoy, white.
Magicienne, chamois color.
Miss Mary Wheeler, pearly white.
Miss W. K. Harris, yellow.
Monadnock, yellow.
Mrs. Alpheus Hardy, white.
Mrs. DeWitt Smith, white.
Mrs. Fottler, soft rose.
Mrs. Irving Clark, pearly white.
Mrs. Sam Houston, white.
Narragansett, white.
Neesima, yellow.
Philippe Lacroix, rose.
Ramona, yellow.
Snowball, white.
Sunnyside, flesh color.
Violet Rose, rose.
William H. Lincoln, yellow.

Of the new ones which are to be sent out this spring, those which are the most promising are:

Ada Spaulding, light pink.
Bohemia, Venetian red.
Cortez, red.
Crown Prince, red.
Cyclone, creamy white.
Harry E. Widener, lemon yellow.
Huron, mauve.
Iroquois, magenta red.
Kearsarge, light mauve.
Mrs. Hicks Arnold, soft rose pink.
Mrs. Thomas A. Edison, delicate rose pink.
President Harrison, bright red.
Shasta, white.
Tacoma, creamy white.

As for new Japanese varieties, of last year's importation, they are not numerous. Some of the best are:

Arizona, yellow.
Elliot F. Shepard, broad, clear yellow petals.
Ithaca, rose.
Raleigh, buff color.
Rohallion, stiff chrome yellow.

From a commercial point of view, chrysanthemums play quite an important part in the nursery and florist's business. Millions of plants are sold every spring from the numerous nurseries through the country, while in the flowering season chrysanthemums are the principal flowers used by the florists. Some maintain that chrysanthemums injure the florist's trade or that they are not profitable to grow for cut flowers. Yet I have always seen good flowers bring good prices, and nowadays in this as in everything else only the best are wanted, and bring good prices, while the poor stuff cannot be given away.

In naming chrysanthemums the reform begun by Dr. Walcott should be followed; that is, the names should be as short as possible, and certainly such names as Alaska, Shasta, and Cortez are far preferable to such as our English or French competitors affix to their novelties. For example, Bronze Queen of England, Hero of Stoke Newington, Monsieur Le Compte de Foucher de Cariel. By all means give us names that can be written on one label.

As to Chrysanthemum Exhibitions, while the various societies and clubs offer fair prizes for either plants or cut flowers, there is yet but very small inducement for the raising of new varieties, which branch should be encouraged more than anything else, so that before long we may see our ideal chrysanthemum, combining all good qualities necessary to make a perfect plant and flower.

Discussion.

In the discussion which followed the reading of Mr. Manda's paper, E. W. Wood was first called on as one of the largest chrysanthemum growers. He said that the paper was a practical one, and that little had been learned on the subject since our last discussion. Growing chrysanthemums is a very easy matter. If large plants are wanted for exhibition, the grower should begin earlier than if he intends to raise smaller plants for house decoration.

For the former he should begin planting his cuttings in December, and he may continue until April. It is difficult to keep foliage on the lower part of early plants, and they do not come up to the ideals of the awarding committees. Plants raised from cuttings taken off and planted in March, and at the proper time transferred to the open ground, make vigorous plants. It is not a difficult matter to take up the plants; the speaker likes to have the ground dry, so that all the earth can be shaken from the roots, and the suckers among them can be removed, which should be done carefully and thoroughly. Pinching is generally desirable, but some varieties make perfect plants without; Mr. Astie is one of these; the speaker had never nipped one. It is a free-flowering variety. He stops pinching about the 25th of July.

The market is flooded with new varieties, which are very easily raised, though formerly it was thought impossible to do it here. Mr. Wood had a plant of Citronella, one of the pompon class, which was placed in the store of a druggist, who watered it for two weeks, until the flowers dried up, when he ceased watering. Watering was afterwards resumed, but the roots of the plant were dead. The seed ripened and fell to the surface of the earth in the pot and grew there, so that one hundred seedlings were potted from it, and this was only a quarter part of the whole number. If plants are hybridized while in bloom and then put in a dry place they will ripen plenty of seed. If the seed is sown in January the seedling plants will afford good cuttings in March, from which plants can be grown to flower well in November. You must grow a hundred seedlings to get one that you would want to grow a second year. Mrs. Wheeler forms a handsome plant and has fine flowers, but is very difficult to grow. Mrs. Alpheus Hardy is also difficult to grow.

Joseph H. Woodford spoke of a gardener who took cuttings the last of May, which he stuck six inches apart all over the surface of a spent hot-bed. The cuttings all rooted, and at the approach of frost boards were added to the frame of the bed and sash placed thereon. The plants were quite vigorous, and each produced one or two blooms of splendid size and quality — in fact, the best flowers of all his plants.

Joseph Clark agreed with Mr. Wood that it is important to have the soil dry when the plants are taken up, so that the soil can be shaken out and the white suckers removed.

The Chairman of the Committee on Publication and Discussion announced for the next Saturday, a paper on "Cemeteries and Parks," by John G. Barker, Superintendent of Forest Hills Cemetery, Jamaica Plain.

BUSINESS MEETING.

SATURDAY, February 15, 1890.

An adjourned meeting of the Society was holden at half past eleven o'clock, the President, William H. Spooner, in the chair.

The following vote was presented by Francis H. Appleton:

Voted, That this Society extend to each incorporated Agricultural, and Horticultural Society of Massachusetts, having a delegate in the State Board of Agriculture, an invitation to appoint one of its members, who shall have the free use of this Library and Room (no book to be taken from the room) during the year 1890, for the purpose of preparing Essays for delivery at Institutes of their own or other societies. The said members to be appointed by the President and Secretary of their respective societies.

The vote was unanimously adopted.

Joseph H. Woodford moved that a committee of three be appointed by the Chair to nominate candidates for a Committee on Window Gardening for the year 1890. The motion was carried, and the Chair appointed as that Committee, Mr. Woodford, John G. Barker, and Robert T. Jackson.

Adjourned to Saturday, February 22, 1890, at half past eleven o'clock.

MEETING FOR DISCUSSION.

Cemeteries and Parks.

By John G. Barker, Superintendent of Forest Hills Cemetery, Jamaica Plain.

Either one of these topics would suggest more than enough to take up the allotted time for one of these discussions. I hardly know what is expected of me; perhaps this wide range was given me so that I could go where I please for information, and bring you such facts as my own experience and correspondence might suggest, so I will make some observations noted during my vacation the basis of what I have to say. I cannot resist the temptation to give you a little account of my first visit on this excursion, although it was not to a cemetery or a park.

After several weeks of careful planning that everything should go on uninterruptedly and successfully, and with anticipations of a pleasant and profitable rest from accustomed labors for a brief period, on the afternoon of September 10 I met a genial friend at the Boston and Albany Railroad station, in whose company the trip was made. In a few brief hours we were two hundred miles from home, and the next morning in good season we called at the nursery of an old and much respected friend — an enthusiast in the strongest sense of the term, from his boyhood to the present day, in regard to everything that is beautiful in nature and art—one who can tell you more than any other man of whom I know, about all that is good in both old and new foliage and flowering plants, and who has kept the run of all the changes in taste and style of planting and bedding out and landscape art. Indeed, nothing in horticulture has escaped his scrutiny and criticism, and he never was carried away with any new thing that came along merely because it was new, although always recognizing the good in the new. His standard has always been high, and he has felt a commendable pride in trying to elevate his profession. Today his collection of plants is a very choice one, and many fine specimens of rare and choice species and varieties are to be seen as evidences of his skill and ability. His catalogues are most carefully compiled, and I believe that not a tree, shrub, or plant is named in them but has some merit or value.

At the age of seven years he had a little money, which he spent for a few Cacti, his acquaintance with them thus covering a period of seventy-four years, and now his collection of these plants is one of the best to be found. In answer to the question: Out of all that you have which are called for the most? he replied, *Cereus glaucus* (a plant of which he has owned forty years), *Opuntia pulvina* or *microdasys*, and *Opuntia tunicata* var. *ferox variegata*. Strolling through the grounds, we find many of the new and rare Japan evergreens, the choicest of herbaceous plants, as well as trees and shrubs, among which is one of the best trained specimens of *Salisburia adiantifolia* we have ever seen. This elegant tree is at least twenty feet high and eight feet in diameter. Do you wonder that we were charmed by the enthusiasm of this truly wonderful gentleman, whom, if you have not already made up your mind who he is, I will introduce to you as Louis Menand of Albany, eighty-two years old, but old in years only — young in mind, and his activity unabated. Many will doubtless remember the fine collection of rare plants which he brought two hundred miles to our Annual Exhibition in 1874. May his manly qualities and true love for one of the noblest arts be imitated by us all!

Albany Rural Cemetery. A short walk from Mr. Menand's brought us to this cemetery, which was incorporated in 1841 and consecrated in 1844. It now comprises three hundred acres, about two hundred of which is laid out in drives, and one hundred and fifty acres is either occupied or laid out in lots.

The varied surface of hill and dale is very striking. The beautiful natural ravines are so charming that it would seem as if nature had here done her very best to provide a fitting place for this rural cemetery. The long winding drives, showing a vista here and a more extended view there, make the whole area truly delightful. In passing around the cemetery we were shown the last resting places of President Arthur, Erastus Corning, Daniel Manning, and many other persons prominent in political and mercantile life.

This corporation does not insist on the perpetual care of lots, but leaves it optional with the lot owners to provide for such care by the deposit of such amounts of money as may be agreed upon with the association. These amounts are determined by the size and character of the lots. The system adopted provides that the income of the sum agreed upon shall be used in keeping the lot in

good order by cutting the grass, making or keeping up mounds, filling up depressions, fertilizing the soil as often as is necessary, and cleaning monuments.

Oakwood Cemetery, Troy, N. Y. We give you as the most accurate and best description of this superbly located cemetery the following account taken from the "Troy Daily Times" of November 7, 1889:

"The cemetery stands at the summit of an abrupt line of hills overlooking the Hudson, and the view takes in a range of distant hills and mountains of nearly one hundred miles in extent. With the purchases of recent years there is a length of the home-hills of a mile and a half which the cemetery now covers. At all the bends in the course of its western hilly outline there are stretches either of new landscape or of different views of spots that are enchanting.

The territory of Oakwood cemetery is partly in Troy and partly in Lansingburgh. The Earl chapel stands in Lansingburgh, but the dividing line is just south of the building. Although lying within the limits of two corporations, Oakwood is a corporation of itself and independent of the others. It is truly a city of the dead, respectable for the number of its inhabitants, which has reached nearly ten thousand.

It is no easy task to lay out a cemetery so that while it shall have a park-like effect it shall also conform to the purposes of burial, but it is generally conceded that Superintendent Boetcher has been eminently successful in this direction. About five years ago the trustees decided to make the western entrance not only useful by locating its offices there, but attractive as well to the many to whom that ingress is most convenient. With this end in view property west of the Fitchburg railroad bridge was purchased and enclosed, and will always be reserved for ornamental purposes. The shrubs and trees planted on this section have made progress, and in a few years will, with the beautiful lawns, add much to the attractiveness of the surrounding property. The ground enclosed at the western entrance is two hundred and fifty-six feet wide by more than seven hundred feet in length.

The offices of the company are in a fine brick building with stone trimmings, at the western or Cemetery avenue entrance. The gates to this entrance are handsome granite monuments, so designed that they will some day serve the purpose of pedestals,

for two ideal statues, suitable for such a place. Their fitness is beyond question, and it seems a pity that some one or two worthy citizens who have love for the cemetery as well as for some departed friend have not been impressed with the suitability of these gates for memorials.

The grounds in recent years have been rendered interesting to horticulturists by the introduction of rare shrubs and plants, which, scattered over the extended territory, meet the eye at every turn and serve to educate the visitors in the advances made in the production of new hybrids as well as in the introduction of new plants from all temperate parts of the globe. The umbrella tree from Japan, the blue spruce from Colorado, and many other evergreens quite new and rare, deciduous trees and shrubs of curiously cut foliage, with varied colors even during their period of growth, and herbaceous plants with a luxuriance of bloom that would keep pace with even the tropical regions, attract many people educated in such matters.

The roads, which in the newer portion have been laid out of ample width, are macadamized, as well as the more restricted thoroughfares in the older part, the presence of rock in abundance enabling the work to be done at a comparatively small cost. The large amount of pleasure driving in the grounds attests the excellence of the roads.

Oakwood has a reputation for being well kept, second to none. As to the neglected condition of many lots in prominent positions, the fact should be stated that nearly all of these lots are owned by persons abundantly able to pay for their care, but they have neglected to do so. September 1, 1873, a system of perpetual care for lots was inaugurated, and since that time no lots have been sold without this provision. This system is being generally copied throughout the country, and frequent applications are made at the Oakwood cemetery office for duplicates of the certificates and books of entry used by the association.

The original purchase for Oakwood cemetery included one hundred and fifty acres. The grounds have been enlarged by more recent purchases to double the original size. Should the sale of lots continue at the ratio of the past twenty years, the next two decades will see the available land within the bounds of the cemetery occupied. Thousands of memorial stones attest Death's industry, and elaborate and stately monuments on every hand

indicate the lavish use of means to decorate the beautiful city of the dead. It has been remarked by visiting superintendents of other cemeteries that the number of important memorial erections in Oakwood exceeds that of any other cemetery in the country in proportion to its size. Nature has been so lavish in its adornment and so much skill has been employed in landscape gardening that praise cannot fail to be sincere along these lines."

This account of Oakwood is by no means too strongly drawn. There are several lakes in different parts of the grounds, adding to the attractiveness and interest of the place, while the planting of the shrubs and herbaceous plants is in excellent taste. The rearrangement of the old or early occupied part of the cemetery, by the removal of iron fences and hedges; sodding up useless walks; removal of overgrown trees and shrubs and planting anew, has made it nearly as attractive as the newer part. Superintendent Boetcher, who has charge of Oakwood, was formerly with Adolph Strauch, at Cincinnati.

Forest Hill Cemetery, Utica, N. Y. We were very much interested in visiting this cemetery, for here we received our first instruction in cemetery duties. Our particular interest naturally centred in that part of the grounds where many, well known to us in the walks of life, now repose, their monuments and tablets informing us that they have passed from earthly scenes. The extent of the grounds owned by the association is two hundred and fifty acres, of which one hundred and ten acres are improved and occupied. The situation cannot be excelled; one of the best outlooks for pleasing views is here obtained, commanding the city and surrounding country, with its great wealth of natural beauty. From many elevated points the distant views are very fine, showing the magnificent valleys and the hills beyond. The outlook in every direction is very interesting, and on a clear day nothing more beautiful than the views from Forest Hill can be conceived.

Many people visiting the cemetery have noticed a peculiar granite boulder, on a little mound, near the entrance, and have wondered what it was and why it was there. This is the famous Oneida Stone which was held in great reverence by the Oneida Indians. It was fabled to have fallen from heaven as a special gift of the Manitou to their tribe. Their councils of war were held around it, as it was supposed to bring them success against their enemies. When the tribe fell under the rule of the white

man the stone mysteriously disappeared and all trace of it was lost. It was afterward found on the top of a hill at Stockbridge, N. Y., and placed in Forest Hill Cemetery. Among the many rich and beautiful memorials that fill the cemetery there is none more appropriate than this monument to the ancient people of Central New York, the Oneida Indians. The sacred character of the stone was doubtless attributed to it on account of its peculiar shape as well as the fact that it is a kind of granite not generally found in this part of the State.

The new part of the grounds is laid out on the landscape-lawn plan, with broad avenues and liberal sized sections of lots, which are adorned by an unusually large number of fine granite monuments of superior design and workmanship. The Childs Memorial Chapel, situated near the entrance, is church-like in form and appearance. The nave only of the chapel is used for burial services; the aisles contain the tombs, one hundred and forty in number. They are built in tiers, are of stone, and open from each side of the chapel, but are screened from view by wooden partitions and doors. The building thus answers the double purpose of chapel and receiving tomb.

Besides the chapel just mentioned, there is, through the munificence of Thomas Hopper, a combined chapel and conservatory. The main body of this building is eighty by thirty-six feet, and its greatest height is twenty-five feet; in addition there is on each side a "lean-to" or wing, ten feet wide, and thirteen feet high, running the length of the main structure; also a covered porch or carriage-way. The main portion of the building is arranged for holding services, movable seats and other conveniences being provided. In the wings on each side, the tropical plants are arranged. There are no partitions between the wings and the auditorium. I can imagine that to pay the last tribute of respect to our dead amid such surroundings is much more comforting than to perform this service in a poorly warmed chapel, or in the dangerous out-door exposure of a cold climate like that usual in Central New York.

Under the superintendence of Roderick Campbell the grounds have been improved and extended, and many flower beds and other decorative features were noticeable. An important improvement, which has been recently made, is the building of a reservoir, holding five million gallons of water. Connected with it are a

series of lakes, one below another, their surfaces dotted with many beautiful lilies. Trees and shrubs have been liberally planted to beautify the grounds. To supply the demands for plants, etc., for decorative purposes, there are three span-roofed greenhouses, each twenty by eighty feet, and three lean-tos, eight by eighty feet.

We regret that a large cemetery like this should leave it optional with the purchasers of lots whether they shall be under perpetual care or not. The wisdom of connecting that provision with all sales needs no discussion. The last resting places of Ex-Gov. Seymour and Hon. Roscoe Conkling were pointed out to us. They are buried in the same lot, located on a slope commanding a beautiful view of the Saquoit and Oriskany valleys.

Oakwood Cemetery, Syracuse, is delightfully situated in a beautiful oak grove, only a short distance from the center of the city, and is easily reached by the street cars. Nature has done a great deal here—indeed she seems to have been anxious to bestow all that she could on this one spot. The almost natural places for the drives or avenues are so varied that a charm is before you at every turn, and at some points the lovely views are so impressive that we should have enjoyed stopping for an indefinite time to take them fully in. At the dedication of Oakwood, on the third of November, 1859, Hon. E. W. Leavenworth, the President, in his address said: "Within its one hundred acres is embraced a combination of attractions which, if anywhere equalled, are nowhere surpassed. Placed most fortunately, not too near the city nor too remote from it; mostly covered with young and thrifty woods of the second growth, so abundant as to allow great opportunity for selections; its surface diversified by the most beautiful and varied elevations and depressions, presenting views unparalleled in their extent and magnificence; rendered already attractive by natural lawns, and the most picturesque scenery—it is all that the highest judgment and taste can demand, or the liveliest fancy paint, and the careful hand of improvement will, each successive year, develop and heighten the charms with which nature has so liberally adorned it." This is no overdrawn picture, and it is as true now as then.

Since that time of course many improvements have been made, and others are now in progress. Many elegant monuments and one costly mausoleum have been erected, and these adornments are not so crowded as to mar the natural beauty of the grounds, as in many of our cemeteries. A convenient chapel and receiving

tomb, located near the main entrance, was built in 1880. It is a very desirable acquisition; some such arrangement should be found in every large and well ordered cemetery. We noticed that some thinning out was being done, where the crowded condition of the natural growth demanded it, and where necessary the ground was regraded at the same time. We were pleased to meet Mr. Chaffee, the superintendent, who unfolded to us his plans for the future, and manifested a laudable ambition to keep pace with the times by carrying them into effect. The contemplated improvements give promise that in the near future Oakwood will become a delightful resort for strangers as well as proprietors.

Forest Lawn Cemetery, Buffalo, contains about two hundred and fifty acres, access to it being furnished by the Main street railroad, which terminates opposite the cemetery. The cemetery is decidedly park-like in its appearance, being laid out on the most liberal scale, with broad avenues and large sections of lots. The following extract from the history of Forest Lawn will give a good idea of the plan in the minds of the projectors. These remarks had special reference to the improvement of the grounds, but they are as suggestive of right methods now as when they were first uttered:

"It will not be denied that in many particulars, such as the style, kind, and relative position of monuments; the laying out, adornment and character of the boundary lines of lots, and their floral and arboreal decoration, individual fancies should be subordinate to a general plan, and subject to certain rules designed to secure harmony and uniformity, and to exclude all such manifest violations of good taste as often mar our places of sepulture. The trustees feel that it will only be necessary to state this general plan, and to mention a few of the arguments in support of the rules which have been established, to secure the assent and hearty co-operation of all who feel an interest or ambition in the success and prosperity of the enterprise. It was considered of the first importance to locate this cemetery where it would enjoy a permanent seclusion; where the expenditure of taste and money would become a heritage for all coming time; where the desecrating tendencies of modern commercial growth should never violate its sanctity, nor the encroaching waves of a noisy, restless, city life, disturb its repose."

More than twenty years have passed since these views were expressed, and certainly there is today abundant evidence that the spot selected fulfils, in a remarkable degree, the conditions named. Nature was by no means sparing here in her bestowal of diversified beauty. Many a fine native tree is seen, which, having been carefully guarded and protected, adds grace and beauty to the scenery, and these, with the hills and dales, lakes and streams, give to the whole grounds more of a park-like appearance than we have observed in any other cemetery. The avenues were so excellent that we took pains to ascertain the mode of construction. We soon learned that an abundance of the necessary material was easily obtained for this purpose; this, with the superior knowledge of the superintendent in its use, accounted for the excellence of the avenues, as was shown by a piece of new avenue in process of construction. To facilitate this work a Gates stone crusher is used, which, set up ready for operation, cost about $2,500, and turns out from fifty-five to sixty cubic yards a day, at a cost of about fifty cents a yard, delivered in any part of the grounds. In my visits to cemeteries I almost always find some one feature that is especially commendable, and in Forest Lawn it is the avenues.

While riding through the grounds we could not help noticing what seemed to us a deficiency of shrubs and flowers—not the perishable ones that must be renewed each year—but in grounds where the plots are laid out on the liberal scale here adopted, the attractiveness of the whole is greatly increased by judiciously planting groups of hardy flowers and choice evergreens and other shrubs. But, under the efficient management of the present superintendent, we have no doubt that all deficiencies will be made good and Forest Lawn will continue to advance toward the front rank among the cemeteries of America.

We passed Sunday at Hamilton, Canada. Taking a drive over the city we were pleased to see so many neat and cosy cottages, with well kept grounds and a garden attached to each. We looked through the cemetery, which, although clean, was extremely crowded with monuments and iron fences, and showed no signs of modern improvements. The next morning we proceeded to Detroit, to attend the third annual convention of the Association of American Cemetery Superintendents. This association was organized to meet a long felt want. We needed to know more of each other; of the work that we are doing at our respective places,

with the various methods adopted in doing it, and we have already received great benefit from these meetings. At Detroit we had a large representation. Eighteen practical papers on different subjects pertaining to our work were read and discussed, with much profit to all, and especially to such as cannot have the advantages enjoyed by those who are located near large cities. This year we meet at Boston, at the same time as the Society of American Florists, and we expect that much greater advantages will be gained from these meetings. At the close of the convention we were taken on a ride through the city, and the different cemeteries.

Woodmere Cemetery is located in the township of Springwells, about four and three-quarters miles from the City Hall. It comprises two hundred acres, and it is claimed that nowhere else within as many miles of Detroit could an equal area be found so admirably adapted for a rural cemetery. Portions of the grounds consist of hills, valleys, and gentle undulations. A broad expanse of water on the westerly side is known as Baby Creek, and Deer Creek crosses the centre from east to west. When these streams are cleared and improved, lakes over two miles in length will be formed, constituting a charming feature of the place. The grounds are laid out on the landscape-lawn plan, with liberal avenues and broad sections of lots. The extreme drought last summer in the West was very detrimental to the appearance of most places there, and the dryness of the grass showed that this cemetery was not excepted. Many fine trees as well as shrubs were noticed; the latter in groups and as single specimens. The Tupelo tree, known there as the Pepperidge, was strikingly beautiful. I have seen many of them in their fall foliage, which is always rich and handsome, but the intense scarlet, or perhaps crimson, color of these was the richest I have ever seen. The dry weather may have had the effect to produce this unusual color. The Tupelo tree deserves to be cultivated much more than it is at present. With its capabilities for improvement Woodmere may be made a most attractive and beautiful place.

Elmwood is the oldest cemetery at Detroit, and is nearly filled up. The grounds were laid out in the old style of avenue and path, but we were pleased to see that wherever any improvement could be made advantage had been taken of the opportunity, and every effort was being made to keep the grounds clean and attractive. Near the entrance some floral designs in good taste and not

overdone were noticeable. One consisted of a cross with an anchor and heart on either side, and a scroll at the foot of the cross with the word PEACE; this design, lying on a slight slope, showed to good advantage. A new and substantial gateway with an office and waiting-room connected, built of stone, is one of the recent improvements.

Mount Elliott Cemetery is also one of Detroit's principal burial grounds, and while it contains no costly monument, or other prominent feature that commands especial notice, it is only just to say that these are the best kept grounds we have seen in a Catholic cemetery, and we therefore think we ought to make special mention of this happy departure. We learn that in the new grounds, recently purchased, modern plans and principles of cemetery improvement will be adopted and carried out.

Woodlawn Cemetery, Toledo, Ohio, is delightfully situated. It is but three miles from the heart of the city, and seems to be well adapted to the purpose to which it is devoted. The grounds were cut by a deep natural ravine, which has been converted into a lake, forming a very agreeable feature of the grounds. The trees and shrubs are appropriately planted, as single specimens and in groups, and have now attained a size that makes them very effective. The remaining portions of the grounds are of a gently undulating character, sufficient to produce a good landscape effect, without too striking a contrast between adjoining lots. The planting all through the grounds has been done judiciously and in good taste. The evergreens were especially conspicuous, being large enough to give life and character to the place, especially in the winter season. The lawn-plan was originally adopted and has been very successfully carried out. It has many advantages over the old style where gravel walks give access to all the lots, as is nowhere better demonstrated than here, and it is doubtless fully appreciated. Like some other places we have mentioned, the grounds are laid out into sections in which we were pleased to see that the lots vary greatly in size and shape. Too often the uniformity in this respect is distressing, but that has been avoided here, and it seems impossible that all the varied tastes of its patrons should not be fully satisfied.

The chapel is a beautiful building on the bank of the lake. A *porte-cochère* protects the entrance. The interior is twenty-eight feet square, with a high vaulted roof, and is lighted by three stained

glass windows. The ceiling is finished in a tasteful style, and altogether the building is a model of neatness and beauty. The area of the cemetery is one hundred and sixty acres, and we think the patrons of Woodlawn may be congratulated that, these grounds having been begun at a later date than the other cemeteries we have named, the trustees have been able, in making their plans, to profit by the experience of others, and we venture to predict that a few years hence Toledo can boast of having one of the most beautiful cemeteries in the West. A small nursery of choice trees and shrubs gives promise that there will be no lack of suitable material for the ornamentation of the grounds as the improvements advance. The avenues are broad and well kept, neatness and good order are the rule, and it is well carried out. Mr. Frank Eurich, the present superintendent, has held that office since the commencement of the grounds. Our thanks are due to him and to Mr. Walbridge, the secretary, for their kindness in showing us not only the cemetery grounds but the beautiful city of Toledo, the home of F. J. Scott, the author of "Suburban Home Grounds."

Spring Grove Cemetery, Cincinnati, Ohio. This, more than any of the cemeteries of which I have spoken, had attracted us from the fact that it has always, as you are undoubtedly aware, been reputed the finest cemetery on this continent. I cannot give you a detailed description of it, as my time is too limited to do it justice, but I will briefly call your attention to its principal features.

We will suppose ourselves at the entrance on Spring Grove Avenue. The gateway is a large stone structure in the Norman Gothic style of architecture; the total length being one hundred and thirty feet. It was erected at a cost of about fifty thousand dollars. The larger portion is at the right side, the building here containing a room for visitors, the Directors' room, and Superintendent's office. At the left side is the ladies' reception room. A little further to the left is the Chapel, built in 1881, at a cost of sixty thousand dollars. This also is in the Norman style, and is a very handsome edifice, one hundred and eight feet long by sixty-three feet wide. The ground plan is cruciform, the vestibule and chapel occupying the nave, with a receiving tomb thirteen by twenty feet in each of the transepts. The heavy bronze doors to the receiving tombs are of very elegant design. The subject of one is: The Widow's Son — the Saviour touching the bier, with

the words, "Young man, I say unto thee, arise." The subject of the second is: Jairus's Daughter — the Saviour touching the maiden's hand, with the words, "Be not afraid, only believe." The subject of the third is: Martha and the Saviour at the grave of Lazarus, with the words, "Thy brother shall rise again"; and of the fourth, the Saviour arising from the tomb, with the words, "I am the resurrection and the life." The great window in the chancel is of elegant design and workmanship, being fourteen feet and six inches wide by twenty feet high. The design represents the Ascension of Christ, accompanied by two angels, while the eleven disciples stand below, gazing in awe and wonder upon the heavenly scene.

Passing from the building into the grounds, we find ourselves on the main avenue, in the centre of a beautiful lawn stretching right and left and adorned by trees, as specimens, and artistic groups of evergreens, which are charmingly arranged, and in themselves a study for all who have a love for landscape art. This part of the grounds has a level surface, and it is truly wonderful what art has produced on what must have been a barren plain. It will interest you to know that on this lawn there has been planted a group of trees as a memorial of the late Dr. Warder, presented for this purpose by his son, Reuben Warder. In the centre of the group is an *Abies concolor* surrounded by *Pinus pungens.* This is to be known as the "Dr. Warder memorial group of evergreens." We next pass under the railroad bridge and come in sight of a chain of beautiful lakes, containing several small islands, the largest of which was donated some time ago, by the corporation, to Mr. Strauch, the Superintendent, as a family burial ground, and his remains now rest in the quietude of this lovely spot. Near by is a beautiful statue of Egeria, in close proximity to a grove of Louisiana cypress, which are very fine. Our attention was frequently called to the trees and shrubs, which are a special feature of the place. To enumerate them all would be impossible, but we noticed particularly the following superb specimens: *Abies excelsa*, some very large; *A. polita* (the Corean Spruce), *A. compacta nana*, *A. Alcocquiana*, *A. concolor*, *Magnolia stellata*, *M. glauca*, *M. tripetala;* elegant specimens of Liquidambar; Laurel leafed oak,—most beautiful specimens; *Quercus alba* (the American White Oak), grand trees; *Q. palustris* (Pin Oak), tall and elegant trees; *Q. castanea* (Chestnut Oak), one of the most grace-

ful of the oaks; *Pinus mugho* (Dwarf Mugho Pine), *P. Cembra* (Swiss Stone Pine), a handsome and distinct species, particularly well adapted for cemetery purposes; and of native Beeches, some of the largest and finest trees we have seen; *Liriodendron tulipifera*,—this magnificent tree has attained great size and beauty; *Vitex Agnus-Castus*, very useful; *Platanus occidentalis*, a very large tree on the lawn, at least one hundred feet high. Also an elegant tree of the Osage Orange, full of bright orange colored fruit. The fine proportions of this tree, which was low, spreading, and round-headed, so different from the form in which we see it here in Massachusetts (only in the hedge), were truly fascinating. These are only a few that, by their size as specimens or standing in some prominent place, attracted our attention. The oaks, maples, evergreens of many varieties; the new and rare evergreens from Japan; and all the old and new species and varieties of shrubs, are found in great abundance, and the unusually select collection that are growing in the nurseries in large quantities, is an evidence that the ornamental department of Spring Grove will be kept up to the high standard it has already attained. In this connection our attention was called to the fact that the only monument to Dr. Warder was a Scarlet oak which, I believe, was planted with his own hands. Robert Buchanan, the first president of the association, also has an oak of the same species planted at the head of his grave. The grave of Judge John McLean, who delivered the consecration address in 1854, is marked by a Chestnut oak, and I think Judge Storer's grave is marked by a Hop Hornbeam. In this there is a suggestion to us: the glaring white marble and polished granite are very monotonous in many of our cemeteries; is not this change a step in the direction of reform? Are not these trees far more appropriate memorials than many meaningless stones that are erected?

The original plan for improving the grounds was furnished by John Notman, of Philadelphia, and was executed partially by Howard Daniels, the first Superintendent. Since 1855, improvements have been made according to plans designed by the late Superintendent, Adolph Strauch, who was so very successful in blending the old and the new work that, to a casual observer, the point of meeting of the two designs is hardly noticeable. In all his work he was eminently successful; and as a landscape gardener he stood at the head of his profession, and no man could

have a better monument to his memory than the work that he accomplished at Spring Grove. The influence of the reform he so well commenced has spread over the length and breadth of the land, so that no new cemetery is now laid out in any other way than on the lawn plan.

The lots and avenues are projected on the most liberal scale. When I inform you that the grass cutting is mostly done with horse mowers, you will at once see that the lots are large and the spaces between of liberal breadth. All the surroundings are in the same proportion. Hand mowers are used where the larger ones cannot go, and by this combination a great deal of grass cutting is done in a short time. This arrangement also allows the planting of trees in the large spaces between the lots, to better advantage than would be possible were the land more closely occupied for burial purposes. This is one of the beautiful features of the place. There is no fear of a request to remove a tree every time a monument is erected, and the ability to retain so many fine and rare trees attests the wisdom as well as the good taste displayed in laying out these grounds, in such a way as to leave sufficient room outside the lots for ornamental purposes. The grounds are rolling, hills and valleys abounding. The avenues, laid out in the valleys, their proper places, are about thirty feet wide, with broad sections of lots between. There is no stiffness about them; graceful curves are formed instead of the straight monotonous lines too often seen where they might be avoided. Where the avenues meet, the arrangement is such that in driving you see, at a distance before you, a prominent corner lot ornamented by shrubs in groups with trees. Turning to the right or left the scene may be similar, or you may be interested by a view through a charming vista, or some valley, naturally beautiful but made more so by the hand of art.

There are many beautiful monuments erected, and we noticed some bearing names familiar to some of us. The Drexel Chapel is very prominently located, near one of the lakes. The monuments of Governor Bishop, Nicholas Longworth, Bishop McIlvaine, the elegant Scotch granite sarcophagus of General Joe Hooker, the family monument of General McCook, having twelve columns representing his twelve children, and two urns which represent the parents of General McCook, are among the most prominent. Here also are the resting places of the late Chief

Justice Chase, the parents of the late President U. S. Grant, and the family of Ex-President Hayes. Upon the lot of the late Chief Justice Stanley Matthews is an unpretentious marble monument. Gen. A. T. Goshorn, Director General of the Centennial Exhibition of 1876, has a lot in which his father and mother are buried, and Henry Probasco, the President of the cemetery corporation, has a fine sarcophagus of Scotch granite. On a very sightly eminence is placed a monumental canopy sarcophagus of Scotch granite, which Mr. Schonberger, the owner, can see from his residence in Clifton, a distance of two miles. The elevation on which the monument stands, and that on which Mr. Schonberger's residence is located, are both from one hundred and fifty to two hundred feet above the valley between them.

Spring Grove contains about six hundred acres, of which three hundred and fifty acres have been laid out and improved. There are fourteen miles of avenues, covering an area of thirty-three acres. There are seven miles of fencing, with about two and one-half miles of hedge inside a portion of the fence. There is a complete water system belonging to the cemetery, and fine buildings for all purposes, and every facility for carrying on the work to the best advantage possible.

I cannot close this imperfect account of Spring Grove without expressing my appreciation of the kindness of Mr. William Salway, who succeeded Mr. Strauch as Superintendent, and who is fully qualified to carry on the work so well commenced by his predecessor.

Cedar Hill Cemetery, Hartford, Conn., is situated about three miles from the centre of the city, and contains nearly three hundred acres. The surface is charmingly diversified with hill and vale, lawn and stately trees, and is unusually well adapted for a lawn cemetery. The improvements since the consecration have been on the most liberal basis, as the following quotation from the Superintendent's report in 1886 will show. He says: "The sections now opened for burial purposes are located on the second plateau, and on the second rise of hills, and are from one-half an acre to four acres in size. Each section is surrounded by a broad, well constructed avenue, and contains from thirty-two to one hundred and twenty-five lots."

The whole front of the cemetery extends along New Haven Avenue two thousand nine hundred and four feet. The grounds contain about seventy-three acres, ornamented with lakes, lawns,

trees, and shrubs. The largest lake is over eight acres in extent. The planting of trees and shrubs was an important part of the plan, and has been admirably carried out.

The avenues are a conspicuous feature of this cemetery, being forty, thirty-five, twenty-eight, and twenty-two feet wide, according to location and requirements.

The landscape lawn plan has been strictly adhered to, and no unsightly curbings or iron fences are seen to mar the harmony and beauty of the plan which has been so successfully carried out. The landscape gardener and first Superintendent was Mr. J. Weidenmann, who, I believe, was a pupil of or associated with Adolph Strauch, at Cincinnati, and in looking over the grounds it is quite easy to see that the same principles which govern the plan at Spring Grove, Cincinnati, prevail here also.

The proprietors have been fortunate in receiving some noble gifts. One is a very neat and substantial chapel of beautiful and picturesque appearance, in the English Gothic style. It is built of gray, rough-faced Westerly granite, relieved by the lighter color of the hammered granite dressings, and the dark slate of the roof, which make an agreeable contrast. The interior is rich and beautiful. It was built in accordance with the will of the late Charles H. Northam, and is known as the Northam Memorial Chapel.

Later on, Mrs. Julia A. Gallup, wife of the late Judge Gallup, made provision in her will, by a bequest of $25,000, for a gateway at Cedar Hill. This also has been erected, in a style and material harmonizing with that of the chapel. It consists of two buildings, forty-five feet apart, each measuring eighteen by thirty-one feet. One serves as a waiting room; the other is the office of the Superintendent; and between these two buildings is the entrance. The inside finish of the buildings is very elaborate, and the arrangements are in excellent taste.

The monumental structures are very elegant, and being conspicuously located on the highest elevation in the grounds, are seen from a long distance. In all of our visits to the various cemeteries we have seen no other where so many costly monuments stand on the same extent of ground.

Mr. Robert Scrivener, the present Superintendent, succeeded Mr. Salway, now of Spring Grove, Cincinnati. We are glad to meet such practical men as he, and we hope that his cherished

plans for the future may receive the encouragement due to one so heartily interested in his work. Cedar Hill is a lovely spot, and if the means which the proprietors are abundantly able to supply are only placed at the disposal of the trustees, a bright and prosperous future is before it. The examples of Charles H. Northam and Mrs. Gallup are worthy of emulation.

I have already taken up more time than I intended to occupy. If I have succeeded in interesting you in the work of this important subject; have convinced you that the work of planning Rural Cemeteries is only just commenced, you begin to see, as I do, that all new grounds can have the advantage of profiting by the mistakes made in the older cemeteries, which are many. I should like to have made my descriptions so vivid that you could have seen all these places as I did; how far I have succeeded in this you know. I confess I am sorry to stop here. I should like to have gone into criticisms and practical points gained by observation, but I cannot. I should like to have shown you how some of the old grounds could be improved and beautified, but my time is not sufficient. I should like to have taken up the subject of ornamentation, but if I did I should perhaps have said too much—in what way or how you must for the present only conjecture; and perhaps it is well that I have no more time for this subject, for the reason that a short time ago I was invited to criticise a very radical article bearing on it; at first I felt like doing so, but when I visited the writer of the article, I received such kind attentions, and our views were so thoroughly harmonious on the principal rules which should govern our work, that I could not say a word, although I believe in kindly criticism, for it is helpful. I hope I have given you good reasons why I should forbear at this time.

I have another part now to take up — that of Parks. I shall attempt but little, as my time for preparation was too limited to do it justice. The subject of establishing parks in our cities and larger towns is absorbing a good deal of attention, much time, and large sums of money. Our own city of Boston is coming in for its full share of all. The magnificent system planned for us cannot be excelled. The Back Bay Park has its place; its success and utility are well known to you. The Public Garden—not a park at all—has received all the criticism, kind and unkind, that is good

for it. I am glad it is there. Were I asked whether I would approve all that is done there, perhaps I should answer no, and I am glad that I do differ from others, for if all thought alike what a sameness and monotony there would be. The Public Garden also fills its place, as is shown by the fact that from the blooming of the first hyacinth to the time when frost destroys the last hydrangea, many who cannot get beyond the borders of the city are always to be found there enjoying it. Situated as it is, where neither near nor distant views can be obtained, it is better to make it attractive to the masses, even if it does not in all points fulfil the ideal requirements of good taste, or is so judged by those competent to criticise. I am sure the popular vote would be for the Public Garden, and I venture to say that no expenditure made by the city for the people is more heartily appreciated by them. There is now more reason than ever that the Public Garden should be maintained as such, especially when the park system is being so finely developed.

Living near Franklin Park, I have been glad, as opportunity offered, to go over it and watch the development of the work. Last year a portion known as the Playstead was opened to the public. Approaching from Walnut Avenue, you drive around this area of some thirty acres or more, by the Pierpont and Playstead roads, and the Overlook, connecting with the old Trail road to Humboldt Avenue. The Glen road, from Sigourney street to the Pierpont road, is finished, forming a direct route to Jamaica Plain, and the circuit drive, from Pierpont road to Williams street, which will eventually connect with Forest Hills Avenue. These are splendid drives, and no one can doubt the wisdom of the system that has been adopted. Everything is done thoroughly and in the best possible manner. The drives are already delightful and enjoyed by thousands every fine day. The trees and shrubs, with the growth of a few short years, will add greatly to the beauty of the Park, and as the time goes on and the plans are carried out, the citizens of Boston will have in their parks a system of developed beauty in nature and art, unequalled in this country.

Then there are the Bussey Park, and Arnold Arboretum, already sufficiently advanced to be of untold interest, especially the Arboretum, which contains the largest collection of named trees and shrubs in America, if not in the world, and is visited every year by hundreds seeking information on the subject of

Arboriculture. I feel that I cannot say too much of the Arboretum and its immense value; I wish I could be heard all over the land, and I would speak of its value and benefits more loudly every time. I do not believe one-tenth part of those interested in horticulture begin to appreciate the value of the Arboretum. Go there more if you would know the wealth of beauty awaiting you there. We have in Boston, in our Park system, much to be proud of; and with such men as Frederick Law Olmstead, who as a landscape artist has no equal; Charles S. Sargent, well known to you all; and our friend Jackson Dawson, I am sure that time only is needed to perfect the system so admirably planned, and to be executed by them, and when the plan is perfected they will become the best known parks in America.

Washington Park, Albany. In our visits this year at different places, finding a little time at our disposal, at the close of one day, we drove to Washington Park, in Albany, and though there only a short time, we were so favorably impressed with what we saw that I immediately opened a correspondence with the Superintendent, William S. Egerton, for information in regard to it. Since the reading of the paper at the last meeting of the Society of American Florists, in Buffalo, by Mr. McMillan, Superintendent of the parks there, you have perhaps read the criticisms on that paper. Mr. McMillan took strong ground in advocacy of a system adopted in Buffalo, which admits of comparatively no flowers for ornamentation in their park, and, if my memory serves me rightly, in September there were none of any sort to be seen, in driving through the park. I must confess to great disappointment in this respect. I think that, in a proper way and in suitable places, they could be introduced to good advantage, and that the attractiveness of the large park would thus be greatly enhanced. But be that as it may, we must give Mr. McMillan the credit of being able to present his honest convictions in such a manner as to command respect for them.

But we must return to Washington Park, which is situated a short distance back of the Capitol, and contains ninety acres of land with three miles of avenues, six miles of walks, and a lake of six acres. It is approached from State Street and Madison Avenue on the east, and from Lexington Street on the south. The park and garden appeared so well combined that I have obtained from the Superintendent his reasons for laying it out in this way. He writes as follows:

OFFICE OF THE
BOARD OF COMMISSIONERS OF THE WASHINGTON PARK,
ALBANY, Oct. 21, 1889.

MR. JOHN G. BARKER, Superintendent,
Forest Hills Cemetery, Jamaica Plain.

DEAR SIR:—Your request for Park report is received. This Board does not issue a descriptive report, but simply a detailed statement of expenses, which is sent in to the Common Council soon after January 1 of each year. The annual budget is made out by March 1 of each year, is approved by the Board and sent in to the Finance Committee of the Common Council for insertion in the city tax budget. The Board has under its supervision Washington Park, seven small city parks, and two miles of street or boulevard improvement. The annual budget is about $21,000.

Washington Park	$14,000
City Parks	1,600
Street Maintenance	2,000
Office Expenses	150
Salaries, (Superintendent's bills, Gardener, Treasurer's Clerk)	3,250
	$21,000

The maintenance of Washington Park and the city parks will, I think, compare favorably with any of the parks in the country, and this result is reached by a comparatively small outlay. The labor is entirely under the supervision of the superintendent, and the men are selected and placed by him without dictation or restriction. The park management is outside of politics. A proper criticism might be made as to the monotony of the planting, but a large proportion of the trees (elms) were established on the greater portion of the area now devoted to the park, before the grounds were laid out, and a gradual introduction of a more ornamental character of planting is being perfected as protection is offered by structural windbreaks surrounding the site on the north and west, and as the undesirable original growth disappears with age, etc. Our shrubbery borders are extensive and of great variety, affording a succession of bloom from early spring until late in the fall.

The article I enclose, written for the Sunday Press, June 30, 1889, will give some idea of the floral effects.

Washington Park is of too small an area to secure very extended lawn and meadow effects, or to indulge in masses of deciduous or evergreen planting for distant sky line perspective. The roads, walks, etc., have all been adjusted to the existing topographical features, and considering the piece by piece manner of purchase of the park area and the resultant changes of portions of the original design to accommodate these intermittent purchases, the general effect of the park, as a whole, is very pleasing and the area largely exaggerated to the casual visitor.

The views of landscape architects or gardeners have been repeatedly expressed as antagonistic to floral effects, or the general introduction of such effects in park ornamentation, and I should myself criticise adversely the introduction of such planting in a park where natural effects of lawn and planting are to be desired as the most pleasing and lasting.

Washington Park is centrally located, and is being surrounded by dwellings. It is a nursery ground for children, and the desire of this Board is to make it attractive to all classes of the citizens. We find that a great deal of pleasure is afforded by the floral effects, and many persons owning small estates in the suburbs or country endeavor to introduce similar ornamentation at their homes. The "King Fountain" site, where you probably saw the cannas, pampas grasses, etc., etc., is shown on the plan enclosed. The intention is ultimately to have a fine fountain basin there, and the surroundings have been laid out somewhat in anticipation of this central effect in the design; otherwise the plan would have been very different at this point. It now looks stiff, and the general effect is not altogether pleasing. With the fountain completed and other architectural features appropriately introduced, the garden site will be more in keeping with the general design. This portion of the park is overlooked from the pedestrian concourse above the terraces, and the plan of the garden is outlined with great distinctness. The lake is 1750 feet long with an average width of 150 feet, and contains about six acres. It is artificially supplied from the city mains and is provided with an outlet valve and proper overflow. In summer, boats are used, and in winter, skating and curling are indulged in. The Board maintain a swing tender, croquet tender, and tennis keeper, at their own expense,

no charge being made, and the same privilege is extended in the winter to skaters; the lake being cleaned at the expense of the Board. The lake house and refectory are rented with the privilege of restaurant and boat-letting.

I am sorry I have no photographic views assimilated in our illustrated report to send you, but although proud of the park, the Board has not gone to that expense as yet.

Yours sincerely,

WM. S. EGERTON,
Superintendent and Secretary of Washington Park.

This exceedingly interesting letter sets forth in a plain and clear manner the reasons that prompted the Board of Park Commissioners to plan so liberally and successfully for the pleasure of the citizens of Albany. When we saw the flower beds in September they were in the height of perfection, and so well designed and properly located that even the hurried glance, which was all that our time allowed us, called forth our admiration. Not only the flowers, but the shrubs were such fine specimens that it was a great pleasure to us to see them. In the grouping they were not the huddled mass usually found in such places, but planted far enough apart to allow each one to become a perfect specimen of itself, yet not so far distant from each other that the intended effect was lost. Of course, if one wishes to criticise he can find the opportunity, but having learned the object desired and seen that it had been accomplished, I think criticism is not in order. If we see a good thing we should say so, and encourage the producer. If we do not approve we should be equally frank in saying so, but let us be sure to have a good reason for what we say. We thought we saw a good thing in the Albany Park, and it is a pleasure to report so to you. The Albany Press of June 30th, contained the following very interesting account of this park:

"The pleasure derived from viewing foliage and flowering plants, well arranged and properly placed, seems almost universal. There are a few persons whose distaste for a blaze of color, and dislike of any formal arrangement would lead them back to the days of the old perennial garden of our forefathers, where everything seemed to grow in profusion, in great variety of tints and diversity of form, and without any apparent care-taking supervision. This old-fashioned garden is becoming again the fashion, from the fact that formal ribbon borders, Persian or geometrical designs,

and glaring arrangements of color, have been so extensively introduced by some gardeners, at the fashionable resorts, and to a large extent on pretentious summer estates, that people naturally go back for relief from such arrangements to the old-fashioned garden. Apart from the set arrangement and blaze of color, there is always a suggestion of labor and expense connected with the development of such effects. The growth of the floral display in Washington Park has been gradual, as the facilities for the propagation of plants, and the funds of the park commission have warranted. Some years, the effects have excelled those of previous ones, and then again there has been an apparent retrograde movement, and the display has not been especially attractive. The yearly maintenance has given impetus to, or retarded, the floral display in a ratio proportionate with its magnitude.

The first effort made in floral planting in Washington Park was soon after the appointment of the late Robert L. Johnson as park commissioner and chairman of the planting committee. Not having at that time a propagating house of sufficient size, a small one was constructed on the Taylor mansion grounds, and for two or three years with this little house and the assistance of adjacent hot-bed frames, the gardener was enabled to propagate sufficient plants to make a creditable display. It was not, however, possible to propagate other than soft-wooded plants for bedding purposes, and not until the purchase, by the board of park commissioners, of the Taylor mansion grounds, and the necessary removal and construction of the outbuildings and propagating houses to the present site on the New Scotland plank road, was it possible to propagate and maintain the more desirable class of plants now exhibited at the Willett street entrance of the park. The effort has been made this season to place all the desirable greenhouse plants that will stand the exposure, in the open grounds and to secure effects somewhat tropical in character, the palms being placed along the shady walk at Willett street, and such color and leaf effects, by the introduction of several varieties of alternantheras in masses of color, relieved by other beds of agaves, echeverias, achyranthes, centaureas, and geraniums.

The two large palms, placed in circular beds, surrounded at the base by a variety of ornamental plants, and terminating at

the sod-line with a border of hydrangeas, were given to the park by Mr. Robert L. Johnson during his term as park commissioner, and an extra effort was made this season to place them in the open ground, to relieve the low effects of the surrounding planting.

The arrangement of the beds, on and adjacent to the site of that long delayed King Fountain, owing to the exposure to sun and wind, is entirely different from that of the Willett street side of the park. To relieve the open, flat character of the surface, varied beds of cannas, and proper edgings of plants for contrast of color are introduced, with circular beds of pampas grasses at the walk intersections. The walks are bordered with varieties of geraniums, relieved by circular beds of achyranthes. In the large center bed, are fine specimens of agaves and rare echeverias, and masses of heliotrope perfume the surroundings. The full and final effect of this arrangement will not be secured before the latter part of August when the cannas are fully developed and the pampas grasses are in bloom. The many varieties of coleus, formerly used in the ribbon borders, have been discarded and geraniums substituted, owing to the fact that the low temperature in early June and the cold nights of August, often blights these plants, and thus mars the effect of color much sooner than the varieties of geraniums selected.

What seems to be especially desired to prolong and concentrate not only the floral but the foliage effects in Washington Park, is the construction of a commodious range of ornamental greenhouses, to be located on the plateau, between the ravine drive and Englewood Place—a central structure sufficiently large to accommodate large palms, tree ferns, bananas, and tropical growths, flanked by houses for the protection of rare and interesting specimens of foreign plants; a structure accessible at all seasons, particularly the winter season, to the public. This would make the park more attractive during the winter months, and afford a generous provision for the summer decoration of the lawns without resorting to the soft-wooded species of plants. There is a fine opportunity for some one, a lover of foliage and flowers, and of plethoric purse, to donate a suitable structure of this kind to the park.

A comparison being made of the effects secured in Washington Park, at a comparatively small outlay, with those to be seen

in the more extensive and pretentious parks of the eastern and western cities, is very favorable to us.

This fall, subsequently to the removal of the present border plants by frost, several thousand hyacinth, tulip, and kindred bulbs will be placed in the borders to give an early spring effect, during the months of April and May, in order that the beds may not present such a bare character at this season. These plants will be removed and followed by the usual decorations for the subsequent summer months. A large number of aquatic plants were placed in prepared beds along the lake margins last spring. These will bloom in the season of 1890. The Egyptian and American lotus, the pink and common white water lilies, and several indigenous water plants have taken root, and, if not disturbed, will flower next season.

If the King Fountain is constructed, there will be an opportunity for a generous display of rare aquatic plants around the rim of the basin, and we may arrive at that progressive stage when the *Victoria regia* may bloom in a properly arranged and protected pond. There are possibilities and opportunities for a fine arboretum on the Almshouse grounds, where the botanical students of the Normal, High, and public schools could find specimens for study and comparison.

A small beginning has been made in the introduction of hardy perennials along the Willett street walk, but the location is too much shaded, and these plants will probably be removed to a more congenial and sunny exposure, and planted with some discrimination as to size, foliage, and time of blooming.

There has been too much rain and too little sunshine for the proper growth of almost all the varieties of bedding plants this season, and some of the echeverias, if a timely forethought in the admixture of plenty of sand in the beds had not prevented, would have rotted because of too much moisture.

The gardener is now struggling with the hay and grass, to get the lawns ready for the glorious Fourth, when hundreds of the orphan children will be entertained in the afternoon at the children's playground near the refectory; and the aldermanic display of fireworks (value $600) will take place at the site of the ice fort of two winters ago.

The lawns will be open to the public on the Fourth of July, except where the shrubbery is dense and the flowers are planted,

and it is expected that the public will appreciate and respect this privilege.

Lawn tennis is the rage in Washington Park this season. Thirteen courts are in full blast and more are asked for. Madison avenue is well represented by the youth of that locality. The only trouble the attendant in charge has, is to restrict some enthusiasts to reasonable limits of time, giving an occasional opportunity for others to play. Some definite rules will be shortly posted as to the time allotted for the use of each court, and a restriction will be made as to the use of lawn tennis shoes when playing, in order to preserve the turf."

A continued correspondence with Mr. Egerton brought from him an expression of his ideas on the much discussed park system, and the use of flowers as an ornamental feature; he says:

"In answer to an inquiry from Buffalo with reference to the use of flowers as an ornamental feature in the public parks of Albany, I wrote some weeks since as follows: 'Three of the smaller city parks have some floral embellishment. In Washington Park the floral planting is confined to two localities, especially designed for architectural features to be utilized in connection with the use of flowers: first, the King Fountain site, which is formal in outline, something like the immediate surroundings of the Washington Monument in the Boston Public Garden; and second, the Willett Street side of the park, where the display is not obtrusive and does not interfere with lines of sight across the park, or project prominently into the lawn effects, more centrally located. The planting is formal. The promiscuous introduction of flower beds over a park area is not in good taste, and should not be encouraged. It is more economical, and better in every way, if floral planting is used as a relief to some formal design in architecture or planting to concentrate the effects in contiguous localities or the immediate surroundings, than to spoil the harmony of a long sweep of turf by the introduction of patches of brilliant coloring, as is frequently done in some of the public parks and gardens.

Flowers and foliage plants have their place in park embellishments, and I think the great majority of people frequenting the public parks enjoy flowers and floral effects, when properly and tastefully arranged and appropriately placed. A blaze of color, set patterns in foliage plants, and bizarre effects, are unnatural, not pleasing, and tiresome, and I know of no feature in park em-

bellishments, that requires more taste, careful study, and unremitting attention, than a well arranged flower garden.

It is the easiest thing in the world for a florist or gardener to spoil the entire harmony and pleasing effects of an otherwise beautiful landscape by the introduction of senseless patches of color and set patterns in foliage plants.

The taste for ribbon and carpet gardening is fast disappearing, from the simple fact that it has been overdone. The summer resorts by the sea and inland, pretentious estates and parks,—all have contributed to the nausea, if I may so term it, for the labored, stiff formality of carpet gardening.

From this extreme on the one side, a great many have found relief in the simple effects to be obtained from the herbaceous border and the perennial plants of our forefathers.

Then there is a medium line, I think more pleasing and in good taste, where the introduction of Palms, Bananas, Grasses, Cannas, Agaves and similar semi-tropical plants, supplemented by a judicious use of flowering shrubs and perennial plants, affords opportunities for graceful effects in foliage and color. These, with the more subdued effects of beds of foliage plants less glaring in color, are in greater harmony, more effective and more satisfying.

It is sometimes desirable to obtain a succession of effects, and in the early spring months, when the beds are usually bare, and present a cold appearance, with the surrounding green of the lawns, a blaze of color in tulips and early spring bulbs is welcomed by all as a harbinger of coming summer glories, and is gratefully appreciated.

The early annuals tide over the otherwise vacant weeks, until it is time to put out the less hardy material, stored during the winter months in greenhouses and cold frames.

The gardener's cottage, storage houses, propagating houses and nursery, are what might be termed the ultimate requirements of the park, and have been placed without the park limits, but contiguous thereto.

We have as yet no ornamental house, or winter garden, but I think where a park is much frequented in winter, for skating, driving, etc., such a feature is a desirable acquisition, if the city can afford the expense.

A large ornamental greenhouse or palm house, or range of ornamental houses, capable of storing tropical plants, arranged as

a tropical garden, for the winter months, and open to the public at all seasons, is a very desirable and attractive feature. In summer also, when flanked by flower beds in more or less formal arrangement, it presents a picture entirely in harmony with the general design of a park, if it is so placed as not to be central and too conspicious a feature. Back of these can be economically grouped and properly screened the propagating houses, gardener's cottage, etc.

About twelve thousand tulips, fifty thousand bedding plants, and one hundred palms, etc., are utilized during the season for the Albany parks. The effects obtained seem to be gratifying to our citizens, and particularly so to strangers from the larger cities sojourning temporarily in our midst or passing through Albany.'"

Mr. President, Ladies and Gentlemen: If I have not succeeded in interesting you, I have in detaining you. Rather than to thrust upon you my own views of Cemeteries and Parks, I have brought you the thoughts and suggestions of others, a free and open exchange of which is always helpful, and I have found exceedingly beneficial. While much can and I hope will be said, written, and published on both subjects, we must never lose sight of one very important fact—that *adaptation* in what we do should be our guiding rule, whether it is a cemetery to be laid out, or one to be enlarged and improved, either in a city, a suburban town, or a country village, or if a park, whether it is in and for a city, or in the suburbs,—all these considerations must be known before we can plan successfully. What will be right in one place, will not serve in another. In all be sure that you plan your work well and can have the plans successfully carried out. May we not sincerely hope that as a Society, our influence will be felt wherever we are known, not only in the line of thought to which you have so kindly given your attention today, but in every line that will help to elevate the noble art in which we are all so heartily and earnestly engaged.

At the conclusion of the paper, a vote of thanks to Mr. Barker for his very full and interesting description of the many cemeteries and parks he had recently visited, was unanimously passed.

Discussion.

John C. Hovey said that it was largely through the genius and energy of the first President of this Society, General Henry A. S. Dearborn, that the first rural cemetery, Mount Auburn, was established. This was in 1831, and in 1848 Forest Hills Cemetery in Roxbury was consecrated and for this also we are mainly indebted to General Dearborn. The paper just read shows what has been the influence of these cemeteries, not only in this vicinity, but through the whole country.

Henry Ross, said that he has charge of one of those country cemeteries (at Newton) referred to as being, in its design and development, inspired by Mount Auburn and Forest Hills. How cemeteries shall be planned at the outset is one of the most important points for their projectors to decide. The landscape-lawn plan is generally the most practicable. In grading, we should, as a rule, follow the natural lay of the land, keeping all the undulations, and varying from nature only to make the scene more beautiful. In cases where there is too little undulation, it is easy to raise up hills to break the monotony. He would first lay out avenues. These should have an easy grade, which can be secured by winding round the graceful curves of higher grounds, or the sides of depressions, avoiding all cuts and fillings as much as possible. In selecting material for roadway construction, one must be governed by the circumstances of location. In loose gravel, as at Newton, he would grade with the natural gravel, then lay on four or five inches of blue gravel if it can be obtained; if not, then gravel mixed with a little clay. In a stiff clay soil, the roadway should be dug out two feet deep, and from one foot to fifteen inches of broken stone put in; then two inches of sand, and from four to six inches of binding gravel to finish. Avenues forty feet wide, of which we sometimes hear, are inconsistent with the landscape-lawn plan. They should never be over eighteen or twenty feet, except within from two hundred to four hundred feet of the entrance gate. He would not have gravel walks. All pathways should be sodded, and the grass kept short by frequent use of the lawn mower. By this method, while securing greater symmetry in the plan, a large saving of expense is effected, both in making of walks, and in keeping them clean and in good repair.

When it is necessary to use these grassy paths in wet weather, it is the practice of some to cover them, and, if needful, a part of a lot also, with straw matting, upon which the people can walk, or stand with less discomfort. There should be as much lawn as possible. He would have flowers also, but would do away with geometrical flower beds except near the entrance gateways, and connected buildings, where they blend more harmoniously with the surroundings. Mr. Ross confessed that his taste for evergreens was growing. He would have ornamental grounds filled with a variety of dwarf evergreens, including dark green, bright green, and golden, planted with artistic taste and skill. He had taken out deciduous shrubs standing in improper places, and substituted evergreens. He declared himself a much less strong advocate of deciduous shrubs, in lawn or park, than formerly. The varieties of evergreens we now have are available to form winter gardens. A mass of assorted evergreens, artistically arranged, makes a pleasing contrast with the general sombreness of early winter scenery, and forms one of the kinds of ornamentation which we need. He would not recommend great rows of tall evergreens. Speaking of ornamental water, he quoted the remark made by a playmate of his in boyhood days: "I like that pond, it does not look like a washbowl," as showing the necessity of giving to artificially formed bodies of water that diversity of outline which is so charming a feature of natural lakes. Another point, upon which Mr. Ross laid some emphasis, was, that no lots should be sold until they have been graded.

William J. Hargraves, objected to having sand next above the broken stones in the road-bed of cemetery avenues. Instead of that he would use material of a binding nature.

Mr. Ross replied that sand in Newton will always let water through, and keep everything in place.

Mr. Barker said that Forest Hills Cemetery is not one of the landscape-lawn class, because it was not started as such. It is a garden cemetery. His purpose in the paper read was to describe what he saw in the several places he visited. But he did not mean to be understood as commending all that he described, and wished for kindly criticism from all his hearers.

O. B. Hadwen thought there might be considerable dust in Mr. Ross's avenues. That could be prevented by having them concreted. A cemetery should be quiet, and free from the noise

of carriages over gravel roads. The whole subject is one of great interest to the people, not only of this State but of other States also.

Mr. Ross would have a cemetery made as natural as possible. He considered concrete too artificial for such grounds. As for noise, he thought a carriage would make no more noise passing over a good, hard, well-made gravel road than on a concreted avenue.

Mr. Hovey doubted whether any one system, plan, or method could be devised for use in cemeteries, that would be acceptable to people generally. Tastes differ greatly; some like one thing, some another. Some may not like what is termed landscape gardening, but prefer what is more after Nature.

Announcement was made that Professor G. H. Whitcher, Director of the New Hampshire Agricultural Experiment Station, Hanover, N. H., would read a paper on the "Growth and Nutrition of Plants," at the meeting on the next Saturday.

BUSINESS MEETING.

SATURDAY, February 22, 1890.

An adjourned meeting of the Society was holden at half-past eleven o'clock, the President, William H. Spooner in the Chair.

The Committee to nominate a Window Gardening Committee for the year 1890, reported the following names:

Mrs. Henrietta L. T. Wolcott, Henry L. Clapp,
Miss Sarah W. Story, E. H. Hitchings,
Marshall B. Faxon.

The report was accepted and adopted, and the persons named therein were elected members of the Committee on Window Gardening.

Adjourned to Saturday, March 1, at half-past eleven o'clock.

MEETING FOR DISCUSSION.

The Growth and Nutrition of Plants.

By Professor G. H. Whitcher, Director of the New Hampshire Agricultural Experiment Station, Hanover, N. H.

Mr. President, Ladies and Gentlemen:

The following general heads will indicate the line of my talk today:

1st. The Chemical Composition of Plants.

2nd. Whence the elements, from which these parts are made up, are derived.

3rd. Are all of these parts of equal importance?

4th. Definition of terms, fertilizer, plant food, etc.

5th. How do we feed plants and where get the material?

6th. How shall we decide upon the right food and the best combination, under any given conditions?

7th. Farm-yard manure compared with chemicals.

8th. Chemicals compared with prepared or commercial fertilizers.

Each of these heads would easily occupy an hour, but by condensation, I hope to touch upon all of them in one hour.

(1.) Chemical Composition of Plants.—Chemical analysis shows us that all growing plants, or air dried fodders, contain a variety of substances having unlike properties. Thus, water, starch, sugar, oil, fibre, albuminoids, and ash are found. Now if we are to form an acquaintance with plants, we ought clearly to see and know these facts.

A green plant is cut, taken to the laboratory, and a fair sample of the whole is weighed, and then dried in an oven at 212° until it ceases to lose weight. The loss is *water.*

A field of standing grass is cut on a bright day, and in twelve hours it has lost from one-half to two-thirds of its weight, and this loss is *water.*

A potato is grated in water and the fine parts sink to the bottom. By washing and settling several times, almost pure *starch* is obtained.

The seeds of the cotton plant, if subjected to pressure, yield a considerable amount of *oil.*

Kernels of wheat, if ground and mixed into dough, and this dough washed for a long time in water, give a tough, gluey substance known as *gluten*.

A piece of sugar beet if boiled in alcohol yields, on drying away the alcohol, *sugar*.

Any plant if subjected to the consuming flame, leaves behind an indestructible part called *ash*. Now all plants have most of these substances; in some, one predominates; in others, other parts are prominent, *e. g.* sugar in the beet, starch in the potato, oil in cotton seed, etc. For the purpose of bringing out more clearly the facts thus far stated, I have given below the composition, in pounds per acre, of two crops—one Ensilage, yielding twenty tons per acre; the other Hay, yielding two tons as cured and put in the barn.

			Ensilage, 40,000 lbs.	Hay, 12,000 lbs., as cut.
Water, when cut,			32,580	8,291
Starch,			1,394	1,425
Sugar,			2,800	220
Fibre,			1,825	1,240
Gum,			—	125
Fat,			237	160
Coloring matter,			—	19
Albuminoids	Part coming from air,		643	285
	Nitrogen coming from soil,	113	55	
Ash,		408	180	
Total from soil,		521	235	
Total from air,			39,479	11,765
ASH CONTAINS:				
Phosphoric acid,		44	17	
Potash,		120	77	
Soda,		17	2¼	
Lime,		60	20	
Silica,		150	53¼	
Magnesia,		17	10½	
		408	180	

(2.) SOURCE OF THESE SUBSTANCES.— Plants do not find sugar, starch, etc., in the soil, nor in the air, but they do find, either in the soil or air or both, the elements from which to make these materials. Water comes from the air as rain or snow, is stored in the soil and taken up by the roots of the plant, and, as this

forms a very large per cent of all growing plants, it is seen that the larger part of the plant comes from the air. But is the water all that comes from the air?

Starch, sugar, fibre, gum, and oil are made up of three elements, namely: Carbon, Hydrogen, and Oxygen. The carbon in all of these comes from the carbonic acid gas which exists in the air. The hydrogen and oxygen come from water, which is made up of these two elements. Again about eighty-four per cent of the albuminoids are composed of the same three elements. That such is the source of the plant substance, has been thoroughly proved by numerous experiments. Thus it appears that 39,479 pounds out of 40,000 pounds in the ensilage crop came from the air, and that 11,765 pounds out of 12,000 of the grass crop as cut, came from the same source (12,000 lbs. of grass, in drying in the field, must lose 8,000 lbs. of water, leaving 4,000 lbs. of dry hay).

We are left in doubt as to the origin of the nitrogen of the crop. Experimenters differ in their conclusions as to this element, but we will place it in the list of substances that come from the soil. Doing this, we find that 521 lbs. of the 40 tons of ensilage, is all that comes from the soil, while in the grass crop only 235 lbs. can, by any means, be regarded as originating in the soil. Hence we may well abandon the too common idea that the bulk of the growing plant is made up of elements which come from and therefore exhaust the soil.

(3.) Are all of the Parts that Come from the Soil of Equal Importance? The answer must be that they are not. In the foregoing tabular statement, are given the substances which make up the ash of the crops we are considering; now by experiments of various kinds it has been found that magnesia is necessary for the perfect growth of the plant, but it is also true that in most soils the supply is abundant, so that for all practical purposes magnesia is not to be regarded as an *essential* element.

Silica has been shown to be an unimportant substance, since plants may be grown and matured in solutions where there is no silica present. Lime is absolutely essential to the plants. Plants having every other element within their reach fail to grow, but the addition of lime immediately causes the building up processes of the plant to become active.

But lime is a very common and abundant constituent of most

soils. It seldom becomes exhausted, and while it is possible, and doubtless true of some lands, that they are deficient in lime, yet it is probably also true that the greater part of New England is well supplied with this form of plant food. Lime may, however, act as a fertilizer on soils which, in themselves, are well charged, and it seems certain that a part of the beneficial effects of liming land are due to its indirect action on the soil, by which some of the unavailable parts of the soil are rendered available.

Soda is not regarded as a necessary constituent of plants though it is usually present.

Potash is not only essential, but is lacking in many soils that have been cropped for a long time. Phosphoric acid, too, is equally important and probably about equally deficient in soils,— that is, in an available form.

"Deficient Plant Food" Removed by Various Crops.

	N.	$P^2 O^5$.	$K^2 O$.	Total.	Ratio of $P^2 O^5$ to $K^2 O$.
Corn, Ears and Fodder, 97 bu.,	76¾	35½	82½	194¾	1 : 2.3
Oats, Grain and Straw, 47 bu., .	43¾	15½	51½	110¾	1 : 3.3
Hay, 3 tons, ...	60	21	95½	176½	1 : 4.5
Potatoes, 200 bu., . . .	38½	21½	67	127	1 : 3.1
Clover, 1½ tons, . . .	64	17	58½	139½	1 : 3.5
Wheat, 15 bu., ...	25½	12¼	15	52½	1 : 1.2
Beans, 20 bu., ...	75	20½	53¾	149¼	1 : 2.6
Ensilage, 20 tons, . . .	113	44	120	277	1 : 2.7
Average, ...	62	23.4	67.97		1 : 2.9

The above table shows what various common crops remove from the soil,— that is, the parts which we have to consider, when fertilizing to prevent exhaustion or to restore fertility, namely; Nitrogen, Phosphoric Acid, and Potash. The experience of farmers and the experiments of scientists lead us to the same general conclusion, namely: that these three substances are the ones that become exhausted when soils once profitable become so far reduced in producing capacity that they no longer pay.

(4.) DEFINITIONS.— *Plant food* is any substance, which contributes towards the nourishment of the plant — *e. g.* carbonic acid, water, nitric acid, potash, etc. But a considerable part of this food, nature provides in abundant quantities, free of cost.

Deficient plant food is that part which becomes so diminished, in an available form at least, that the crop producing power of the soil is materially reduced, *e. g.* nitrogen, phosphoric acid, potash.

A *Fertilizer* is any substance which contains available *deficient plant food.*

A *Commercial*, or "prepared," *fertilizer* refers to any of the goods mixed and put up in bags or barrels, and sold under a guarantee of composition.

Chemical fertilizers are those which are compounded from such crude fertilizing chemicals, as bone black, South Carolina rock, muriate of potash, kainit, nitrate of soda, sulphate of ammonia, etc.

Manures are the natural excrement of animals of all kinds, and are as truly *fertilizers* as is any sacked or barrelled material, though in common acceptance, manures are looked upon as being unlike commercial goods in their action on crops. As a matter of fact, they feed the plant on those things which it needs most, just as the prepared fertilizers or chemicals do. Hence there is no valid distinction between *natural* and *artificial* fertilizers.

Farm-yard manure is, and always will be, a standard fertilizer in all agricultural communities where live stock husbandry is practised. Hence an intelligent and economical plan of storage and use is imperative. But today I propose to consider more especially the conditions that have led to an universal use, in all old agricultural regions, of waste products as aids to manures.

There are some who hold that there is no more need today of commercial or chemical fertilizers than there was a half century ago, if only the manures of the farm are saved and used rightly. This cannot be well maintained. In any system of farming, there must be some product sold, else there is no cash coming in, and if crops or animals are sold, then to some extent nitrogen, phosphoric acid, and potash are sold, and the vast quantities of these substances, which the sewers of Boston, New York, and the multitude of cities and villages throughout our land daily pour out into the ocean, represent just so much soil-fertility gone

from the cultivated fields. There is no method of even approximating this loss, so far as I know, but that it is enormous no one can deny.

The eminent French scientist, Grandeau, estimates that one year's crops in France represent 298,200 tons of phosphoric acid. Of this only 151,000 tons were received, leaving a deficiency of 147,000 tons of this one form of plant food which must be made up from outside sources, and right here is where the use of commercial and chemical fertilizers comes in.

Some say, "buy grain," thus adding to your farm some elements brought from another farm. Very good, as far as it goes. We can and we do replenish our soils, at the expense of the West and South. When we buy a ton of shorts, or of cotton seed, or of corn meal, we are transferring plant food from the land where these grew, to the soil where the manure from the animals to which they are fed, is used. From the narrow local horizon this is right, and so long as the West and South do not object, we should continue this. But, from the broad view of the whole country, this is poor policy, and that system of agriculture which shall be permanently successful must feed its crops, so far as possible, where they grew, concentrating bulky crops into compact animal products, and leaving as much as possible of the deficient plant food on the land. But under the best management, the elements of soil-fertility which our rivers carry into the sea must, or should, be made good by utilizing all waste products from slaughter houses, gas works, iron furnaces, and various other manufactories, as well as the stored-up mineral wealth which is found in many countries.

(5.) The feeding of plants is not essentially different from the feeding of animals, except that the soil, in itself, contains most of the food required for them, only a few substances being needed from outside; while with the animal everything must be supplied. The materials containing the deficient plant food,—that is, fertilizers,—are numerous, and their number is increasing. As manufacturers turn their attention towards the utilization of waste products, they find new substances which by proper treatment may be made to supply some one needed form of plant food, and in the following table I have classed those materials which are most common, giving not only the kind and amount of plant food which they contain, but also the cost per hundred pounds, with

freight included, to points say, a hundred miles distant from such centres as Boston, New York City, Baltimore, etc., and in the last column is given the weight per measured half-bushel. This last is given to enable any who may wish to mix these materials themselves, but who do not have facilities for weighing.

Kind of plant food furnished.			Per cwt. of plant food.	Cost per 100 pounds, $.	Weight per ½ bu., lbs.
Phosphoric acid, (P^2O^5).	Insoluble.	Raw bone,	24*	1.75	
		Bone black,	28	1.30	38
		South Carolina Rock,	28	1.25	52
		Bone ash,	35		
	Soluble.	Dissolved S. C. Rock,	16	1.25	30
		" bone black,	16	1.50	30
		" bone,	16	1.75	
Part reverted. (6 per ct.) Part insoluble. (15 per ct.)		Thomas-Gilchrist slag,	21	1.25	

* And two and one-half per cent of nitrogen.

Potash, (K^2O).	Wood ashes,	6	0.50	23
	Muriate of potash,	50	2.40	34
	Sulphate of potash,	22		
	Sulph. potash (high grade),	50	3.50	40
	Kainit,	12	.75	39
	Krugit,	8	.75	39
Nitrogen, (N).	Dried blood,	12	2.00	19
	Fish waste,	7		
	Bone,	2.5*	1.75	
	Nitrate of soda,	15	3.00	44
	Nitrate of potash,	13	5.00	
	Sulphate of ammonia,	20	4.00	31

* And twenty-four per cent phosphoric acid.

(6.) To decide upon the right fertilizer under any given conditions is a matter of some difficulty, but not one beyond solution. A glance at the table, showing what constituents various crops removed from the soil, will give us some information. For example, we see that the average amount of deficient plant food removed per acre, by eight of our most common crops is:

Nitrogen, 62 lbs., Phosphoric acid, 23.4 lbs., Potash, 67.97 lbs. or 2.9 times as much potash as phosphoric acid. We also see that various crops use these materials in different proportions; thus wheat uses phosphoric acid and potash in almost equal quantities, 1 : 1.2, while hay uses 4.5 times as much of the latter as of the former.

But in spite of these figures it might be and is doubtless true, that many soils by the application of a single constituent,—say

phosphoric acid, will produce good crops. This result is due to the fact that soils vary in their natural supply of plant food, and one may be well stocked with potash, but lacking in phosphoric acid. On such, dissolved bone alone will enable the plant to make a full growth. Another soil may be abundantly supplied with phosphoric acid but deficient in potash; under these conditions the use of bone would be wasteful, but potash fertilizers would work great benefit. Thus it happens that we must consult the soil before we can decide upon the kind of fertilizer needed.

To test the soil is not a difficult task. A few rows fertilized with ashes, will often tell us whether potash is the principal thing needed. A few other rows, on which dissolved bone-black alone is used, may give valuable indications. But the most valuable method of testing is, to select some three of the crude materials above tabulated,—say sulphate of ammonia, muriate of potash and dissolved bone-black in various proportions, thus giving mixed fertilizers which shall contain varying percentages of nitrogen, phosphoric acid, and potash, and by using *equal values* per acre, and leaving certain parts with no fertilizer, we may form very accurate estimates of the relative value of each combination. This, it seems to me, is the true test. The following table shows the combinations which were used in the coöperative experiments in New Hampshire in 1889. The top row of figures gives the numbers of the plots; the amounts under these, in the vertical columns represent the amount of each chemical (the name of which is given in the left hand column) used per $\frac{1}{20}$ of an acre. The cost is fifty cents per plot, or $10 per acre, except one, the manured plot, where $20 per acre was invested. The lower part of the table shows what the chemical composition of the mixture was, *e. g.*, plot 1 had a mixture of 18½ lbs. of dissolved bone-black, 3⅔ lbs. of muriate of potash, 3⅔ lbs. of sulphate of ammonia; the analysis of this was, phosphoric acid 11.4%, potash 7%, nitrogen 2.8%. To any who might like to test this method, but do not care to undertake so large an experiment, plots 1, 3, 5, 9, 13, and 16 might be selected and enough rows taken to give 200 hills of corn for each mixture, the fertilizer to be sown broadcast on the rows after planting.

FERTILIZERS USED IN COÖPERATIVE EXPERIMENTS.

NO. OF PLOT:	1	3	4	5	8	9	10	12	13	14	15	16	18	19	20
Kind and Amount of Fertilizer.	lbs.	lbs.	lbs.	lbs.	bu.	lbs.	lbs.	bu.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
Dissolved Bone-black,	18½	24¼	14	–	–	17½	16½	–	16½	–	18½	10½	–	–	33⅓
Muriate of Potash,	3⅔	6	–	17¼	–	8¾	5	–	5	–	3⅔	9½	–	22¼	–
Sulphate of Ammonia,	3⅔	–	7¼	2¾	–	1	3½	–	3½	–	3⅔	3¼	12½	–	–
Ashes,	–	–	–	–	–	–	–	2	–	–	–	–	–	–	–
Manure,	–	–	–	–	30	–	–	–	–	–	–	–	–	–	–
Prepared Fertilizer,	–	–	–	–	–	–	–	–	–	28	–	–	–	–	–
ANALYSIS OF FERTILIZERS.															
Phosphoric Acid,	11.4	12.8	10.5	–	0.23	10.5	10.5	1.5	10.5	12.4	11.4	7.2	–	–	16.
Potash,	7.0	10.0	–	43.5	0.48	16.0	10.	6.5	10.0	2.00	7.0	20.4	–	50	–
Nitrogen,	2.8	–	6.8	2.8	0.48	0.7	2.8	–	2.8	2.5	2.8	2.8	20	–	–

(7.) Can Chemicals Take the Place of Farm Yard Manure?— An experiment was started on the Agricultural College farm, at Hanover, N. H., in 1885, which was designed to throw light on this question.

Two acres of land, from a field of six acres, were selected for this experiment. The land had produced hay for three years previous to 1885; oats and sugar beets had preceded the hay.

The third acre had thirteen loads of manure plowed in and nine loads harrowed in, or in cords this would be

5.6 cords plowed in
and 3.8 cords on the surface,

or 9.4 cords in all,

which would sell, as it laid under the stables, for $33.00. This manure was from fattening steers, well fed with hay, straw, cotton seed, and corn meal. The fourth acre had yearly applications of chemical fertilizers, mixed as follows:

Dissolved bone-black,	346 lbs.
Muriate of potash,	150 lbs.
Sulphate of ammonia,	56 lbs.

The average cost of this mixture has been $11.00, and as there have been three applications since 1885, it follows that each acre has received $33.00 worth of fertilizer; the third having $33.00 worth of manure, and the fourth $33.00 worth of chemicals.

The first year the crop was corn, the second year corn, the third oats, and the fourth grass.

The following table shows the yield of each acre for each year, and also the value of the crop, assuming eighty pounds of corn as harvested to be worth sixty cents, thirty-four pounds of soft corn ten cents, and fodder thirty cents per hundred; oats fifty cents per bushel, straw thirty cents per hundred, and hay ten dollars per ton:

	CORN.				Total yield with manure.	Total yield with chemicals.
	Third acre. Manure.		Fourth acre. Chemicals,			
	1885.	1886.	1885.	1886.		
Sound corn,	112 bu.	83¾ bu.	97 bu.	82¾ bu.	195¾ bu.	179¾ bu.
Soft corn,	16½ bu.	27 bu.	15 bu.	24 bu.	43½ bu.	39 bu.
Fodder,	4835 lbs.	4435 lbs.	5352 lbs.	4927 lbs.	9270 lbs.	10279 lbs.
Value of crop,	$49.75	$41.12	$46.65	$42.00	$90.87	$88.65
	OATS, 1887.					
Grain,	43 bu.		47½ bu.			
Straw,	4535 lbs.		5267 lbs.			
Value of crop,	$35.10		$39.55		$35.10	$39.55
	HAY, 1888.					
Yield,	5880 lbs.		6202 lbs.			
Value,	$29.40		$31.01		$29.40	$31.01
	HAY, 1889.					
Yield,	4200 lbs.		4710 lbs.			
Value,	$21.00		$23.55		$21.00	$23.55
Total value for five years,					$176.37	$182.76
Excess in favor of *Chemicals*,					$6.39	

It will be seen that not only have the chemicals exceeded the manure in the total of five years but also that the chemicals *hold out* better,— a point always assumed to be otherwise. It is proposed to continue this experiment.

(8.) Chemicals Compared with Prepared Fertilizers.— In a series of experiments covering three years, we have arrived at the following conclusion:

Three crops,— corn, oats, and hay, gave us a total value:

With no fertilizer,	$70.07
With Potash alone,	94.74
" Phosphoric Acid alone,	73.66
" " " and Potash,	111.43
" " " " Nitrogen,	56.99
" Chemical fertilizers (complete),	108.56
" Prepared "	95.67
" Ashes,	107.94

In our Coöperative series in 1889:

The best three combinations of chemicals, gave yields of corn averaging, $90.62

Prepared fertilizer,	63.58
No fertilizer,	41.00

If we ask for an explanation of the superiority of Chemicals over Prepared or Commercial goods, it must be answered by comparing the composition,—that is, the relative amount of nitrogen, phosphoric acid, and potash. The average of the prepared fertilizers sold in New Hampshire, in 1889, was as given in the following table, and beside it is given the average of the three best combinations of chemicals in the coöperative series, as well as the average of the best six combinations used on the Agricultural College Farm.

Composition of:

	Prepared fertilizer, 1889.	Best three combinations of chemicals 1888.	Best six chemicals 1886-7-8-9.
Phosphoric acid,	11.08%	9.25%	6.4%
Potash,	2.57	11.3	15.5
Nitrogen,	2.45	3.5	2.5

Other results are equally pronounced, and we must conclude that our soils require *more potash* than is provided in the commercial goods. To get this, farmers are recommended to buy chemicals, and mix according to the follow formulæ:

I.

Chemicals for Corn and Wheat.

Dissolved bone-black,	325
Muriate of potash,	100
Sulphate of ammonia,	75
	500

II.

Corn (same as plot 26 in Experiments).

Dissolved bone-black,	182
Muriate of potash,	252
Sulphate of ammonia,	66
	500

III.

Corn (average of four best yields in plots).

Dissolved bone-black,	175
Muriate of Potash,	250
Sulphate of ammonia,	75
	500

IV.

ENSILAGE.

Dissolved bone-black,	250
Muriate of potash,	200
Sulphate of ammonia,	50
	500

V.

OATS (average of best four plots in Experiments).

Dissolved bone-black,	330
Muriate of potash,	105
Sulphate of ammonia,	65
	500

VI.

OATS (like the best plot in experiments No. 8).

Dissolved bone-black,	300
Muriate of potash,	200
	500

VII.

HAY (average of best four crops).

Dissolved bone-black,	225
Muriate of Potash,	254
Sulphate of ammonia,	21
	500

VIII.

HAY.

Dissolved bone-black,	700
Muriate of Potash,	200
Sulphate of ammonia,	50
	950

IX.

POTATOES.

Dissolved bone-black,	340
Muriate of potash,	160
	500

X.

Potatoes.

Dissolved bone-black,	300
Muriate of potash,	150
Sulphate of ammonia,	50
	500

It will be observed that these combinations contain a considerable quantity of muriate of potash, and it must be borne in mind that if seed comes in direct contact with them there is great danger of the root being injured if not wholly destroyed. For this reason I would especially recommend that a large part of the fertilizer be used broadcast. The amounts above given are for one acre when no manure is to be used. For corn and potatoes I would never put more than one hundred and fifty pounds in or *on* the hills or drills, and I would first plant and cover the seed as though no fertilizer was to be used, and immediately after would apply the one hundred and fifty pounds *on* the top of the hill or drill, leaving it there to be washed down into the soil by the rains. There is little if any loss in this method and I believe the results will be better than from putting the fertilizer *in* the hill.

Combination No. I, I would especially recommend for corn, IV for ensilage, and V for oats; or as will be seen, it is so much like I, that the same mixture may be used for either corn or oats. However, if oats follow corn that has been manured with farmyard manure, it is not necessary to use nitrogen, and in such a case I would recommend No. VI, or the potato mixture, No. IX, may be used.

For hay two combinations are given; the second is to be recommended if four or five crops are wanted.

For potatoes the same remarks as have been made concerning oats will apply; if the potatoes follow some crop that has been manured with stable manure there is no need of nitrogen, and therefore No. IX would be best; in soils deficient in nitrogen No. X might be best.

It will be seen from what has been said that the corn combination I, may be used for corn, wheat, oats, and on some soils for potatoes. The potato mixture, IX, may be used for potatoes and oats on soils that have previously been manured, or are not deficient in nitrogen. For ensilage No. IV is to be recommended.

And now in conclusion, let me urge upon you the importance of trying this plan of feeding your crops. You cannot lose anything by it, you may gain much. Test the matter and know of your own knowledge whether your soil is like that on which we are working in New Hampshire.

The essay excited a deep interest, and held to the end the close attention of the large company present, and a vote of thanks to Professor Whitcher, for his interesting and valuable paper, was unanimously passed.

Discussion.

Joseph H. Woodford, spoke of the nitrate of soda as easily converted into nitrate of potash, a useful fertilizer. He added that any substance used as a fertilizer must be made soluble in water, else it could not be available.

Henry L. Clapp said that there are in different places in Canada, large deposits of apatite, or phosphate of lime, containing over forty per cent of phosphoric acid, and that apatite had been mined for fifteen or twenty years, and carried to England. He asked why it was not brought this way. It seems a pity that the New Hampshire farmer, perhaps living near the Canada line, should be obliged to procure his phosphate from South Carolina, when a dozen phosphate beds are within one hundred and twenty-five miles of Montreal, whence it is shipped to England. In Nova Scotia large quantities of gypsum are found, and very fine potatoes are raised there. Gypsum, under the name of plaster, has been used in the culture of potatoes by New England farmers, especially in the past. It is sulphate of lime and contains forty-five per cent of sulphuric acid. Nova Scotia soil seems to have enough gypsum in it by nature for the successful culture of potatoes, while our soil seems to need it.

Professor Whitcher said that he could only account for the fact that Canadian apatite is not brought to this country, by the protective duty laid on it. The only effect of sulphuric acid on apatite or South Carolina phosphatic rock is to render them soluble. He thought the fine quality of the Nova Scotia potatoes could not be due to the gypsum, for just as good ones are raised in the Aroostook region in Maine, where no plaster is used. In New Hampshire not so much plaster is used as fifteen years ago; it is used as an absorbent in stables.

Edmund Hersey spoke of the feeding of plants in connection with the soil. He had found that what proved beneficial to the soil in New Hampshire and western Massachusetts, was very unsatisfactory on his soil. He had thought potash to be the one thing necessary until by experiments he found it an injury. He went into some nice experiments on this point, and for the present his soil gets along without any additional potash. All farmers should know that potash causes great damage when applied too freely. Probably there are others who, like him, have a supply of potash in the soil. Potash on his soil caused reduced crops, while phosphoric acid produced increased crops. He had never applied too much of the latter, though he had used at the rate of $120 worth to the acre. More than $30 worth of nitrogen is an injury. He has been trying to fix the colors which are produced by an under or over supply of nitrogen, etc. The effect of an over supply of nitrogen on corn is precisely the same as that of a cold storm in May; a blue streak will be seen running down the centre of the leaves. The effect of potash is exactly opposite. He thought he could tell by the color of the leaves, whether corn was injured by an over supply of potash. He asked why his soil should differ from the soils in New Hampshire. It is because soils are made up differently; there may be potash in the stones on some farms, and none in the stones on others. Then again, the stones in a soil may be rich in potash, but not be in such a state of decomposition as to be available for plant food. We cannot learn from the lecture platform or from books how to treat our soils, but farmers must learn from experience not to apply what is not needed. The idea has been prevalent that we only lose the interest on the cost of useless substances applied to our soils, but potash may be taken up by plants in sufficient quantity to reduce crops. Manufacturers of fertilizers cannot tell what any soil needs; only the cultivator can tell.

Mr. Clapp said that some soils are largely composed of feldspar, which contain a good deal of potash. In Topsham, Me., there are large quarries of feldspar, and the soils in that vicinity need little potash, but near Boston, where the soils are largely formed of diabase or trap-rock, potash is needed, and also in limestone soils. We should not only know our soils, but also the character of the rocks from which they are made. It is just as vital a point to find out the cost as the combinations of fertilizers; a dollar's

worth of one fertilizer should be put against a dollar's worth of another. The granite drift soils of New Hampshire seem to need potash because potash feldspar is not abundant enough in them.

O. B. Hadwen said that in making maple sugar a sediment, supposed to be lime, is found in the bottom of the pans in greater or less quantities, and asked how it gets there.

Professor Whitcher said that the lime in maple sap is combined with malic acid, forming malate of lime. More or less of this substance is always present in maple sap.

William D. Philbrick spoke of the work done at the Connecticut Agricultural Experiment Station in regard to settling the wants of soils. Not only different farms, but different fields on the same farm, require different applications.

Mr. Hadwen, as Chairman of the Committee on Discussion, announced that at the meeting next Saturday, Joseph T. Rothrock, Professor of Botany in the University of Pennsylvania, would speak on "Forestry."

BUSINESS MEETING.

SATURDAY, March 1, 1890.

An adjourned meeting of the Society was holden at half past eleven o'clock, the President, William H. Spooner, in the chair.

The Secretary read letters from the Housatonic Agricultural Society and the Worcester North Agricultural Society, conveying the thanks of those Societies for the invitation to appoint a member who should have the free use of the Library and Library Room of the Massachusetts Horticultural Society, for the purpose of preparing papers to be read before the Institutes of those Societies, and announcing that they had respectively appointed James H. Rowley, of Egremont, and George Cruickshanks, of Fitchburg.

JOSEPH GODDARD, of Roxbury,

having been recommended by the Executive Committee, was on ballot duly elected a member of the Society.

J. D. W. French read the following resolutions, adopted by the American Forestry Association at their eighth annual meeting, held at Philadelphia, October 15 to 18, 1889:

Resolved, That we respectfully petition the Senate and House of Representatives of the United States to pass an act withdrawing temporarily from sale all distinctively forest lands belonging to the Government of the United States, as recommended by the Secretaries of the Interior during the past three administrations, and providing for their protection, and authorizing the employment of the army, if necessary for this purpose, until a Commission, to be appointed by the President, shall have made such examination of the forests on the public domain as shall be necessary for determining what regions should be kept permanently in forest, and shall have presented a plan for a national forest administration.

Resolved, That we also petition the Senate and House of Representatives to authorize the President of the United States to appoint a Commission for the purpose of examining the forests on the public domain and reporting to Congress a plan for their permanent management, and that Congress make the necessary appropriations for such Commission.

Mr. French moved that the Massachusetts Horticultural Society endorse these resolutions, and that copies be sent to the Massachusetts Senators and Representatives in Congress, expressing the approval of this Society, and urging that action be taken to carry out the measures asked for in said resolutions.

The motion was unanimously carried.

Adjourned to Saturday, March 8, 1890, at half past eleven o'clock.

MEETING FOR DISCUSSION.

Some Aspects of the Present Forestry Agitation.

By Joseph T. Rothrock, Professor of Botany, University of Pennsylvania, Philadelphia, Penn.

The present forestry agitation represents one of two things:— either a great cause, or no cause. We shall first of all in this paper endeavor to show that it is the former one of these alternatives; and then to suggest some measures, which, if our case is made a clear one, would appear to be both proper and pressing.

A rapid glance backward would possibly be at once the easiest and the surest method of reaching a conclusion. Two hundred and eighty years ago all that region, with which we are now so familiar, between the Atlantic seaboard and the crest of the Alleghany Mountains, and from Nova Scotia to Georgia, to say nothing of Florida, was practically an unbroken forest. Only here and there, two centuries ago, did a community or an individual for a moment dream that a scarcity of timber could occur in a country where the forests were so dense and so vast. It is singular too that all of those who were far seeing enough to anticipate a possible future scarcity of wood were born in Europe. The next generation, the native born Americans, were, probably without exception, or certainly with very rare exceptions, impressed with the view that their woodland heritage could never or would never be exhausted. What was west of the Alleghany Mountains was hardly more than conjecture with the people at large.

Each colony was then practically self-supporting in timber. This is probably all the history we need refer to. But after only a little more than two and a half centuries, with a comparatively small population operating on the timbered half of our continent, how many of the northern States, in the region indicated, are now absolutely self-supporting in timber? Few, if any. Or, to put the problem in another form: How does the timber brought to your markets today compare in quality with that furnished a quarter of a century ago? Does not the smaller size, and the lower grade at once indicate that the best is gone? Or, more directly still, take the most recent and apparently reliable utterance of Professor Prentiss, who has made our Hemlock Spruce a subject of special study:

"It may therefore, be estimated that the full value of the products of the hemlock is, in round numbers, thirty millions of dollars per annum." Yet almost in the same breath he adds, "The length of time during which our remaining hemlock forests will sustain this annual drain is, of course, uncertain; but the the most careful and conservative observers consider that the present supply could not be maintained for a period exceeding twenty or twenty-five years. It becomes, therefore, a question of great practical importance as to the way in which the existing demands upon the hemlock shall be hereafter supplied."

The present demands upon the forests of the Long-leaved Pine (*Pinus palustris*) in the South, point to a rapid destruction of these most valuable trees there, when we remember that the region on which we have already practically destroyed the White Pine is larger than the whole region over which this Long-leaved pine originally grew. This is especially probable since the tree destroying agencies have only recently been concentrated in the South.

So heavy are the calls made upon the Shell-bark hickory and Pig-nut hickory that the wheel makers of the Atlantic seaboard who once used the trees from their own hill-sides, now bring their supplies from Kentucky and Tennessee. Another illustration of the diminished supply of valuable timber remaining in the East is found in the fact, that the centre of production of White Oak staves, has moved from Virginia west to St. Louis. Of course we need barely allude to the removal of the Black Walnut. As things now are, its fate is sealed.

As we have said, all this is in the infancy of our civilization. In the East, these demands upon our forests must increase with increasing population. Still worse, we have already nearly exhausted some of the heaviest forests of the West, long before it has received even a portion of its population, to say nothing of its maximum. In other words, not content with ruining our own heritage, we have actually despoiled the West in advance of the time when the centre of population would be located there. It is indeed hard to say whether this is worse for the East or for the West.

It is useless to urge that substitutes for timber will be found. New uses for it are also found. I think that statistics show that these promised substitutes do not come as fast as the new uses for the wood.

Each year of delay in suggesting and applying remedies for this malady in the body politic, makes the problem a much more serious one, because to produce an average forest requires at the very least, half a century. So much then for the statement that this forestry agitation is the expression of a great cause! But it is not great simply in any local sense. Just as the production of large crops in the West was an important factor in leading to the interstate commerce law, so will the demand of one State upon the forests of another, lead, eventually, to other interstate laws,

or, to what will practically come to the same thing, a prohibition against the removal of timber from the States where it grows to the States where it does not grow. And this, as any one may see, opens avenues to many serious national troubles. The great West poured its blood and its treasure into the war for the opening of the Mississippi Valley in 1861, because its prosperity demanded an open channel to the Gulf. So Kansas, Nebraska, and Utah will demand of Colorado, one of these days, that they shall receive their share of the life-giving flood of the Platte and Grand Rivers to irrigate their otherwise worthless plains, and to support their increasing population in comfort. But back of all this water supply, even in Colorado, we find the forests of the Rocky Mountains, which help to collect and moderate the flow of water into the fertile valleys below, and all plans for irrigation, to be of permanent benefit, must be based on the care of these forests. Among the problems of the future, growing out of the dependence for water supply for purposes of irrigation on timbered mountain area, will be the one of State boundaries. To say the least, it is a mistake that any State should have such a natural boundary as the crest of the Rocky Mountains extending through its centre. Such natural lines, it has become a political axiom, should be state limits. This becomes more than ever clear when we consider its bearing in the light of irrigation and water supply. We might approximate natural boundaries by a line, for instance, extending from longitude 117° west in Idaho, southeast to Laramie in Wyoming, and thence about due south toward El Paso. This, while it would not entirely obviate the trouble, would at least diminish the extent to which several States could be held at the mercy of one. Of course, I only allude to this as a matter for Congress and the States interested, to settle among themselves. It does not directly concern us, though it may yet be a pressing problem for that region.

Look at it from whatever stand-point we may, the forest problem must, sooner or later, enter into the policy of the nation.

It is, of course, easy to find fault with our law-makers, but the fact remains that they never, in this republican government, dare run far in advance of the people. So soon as we can convince them that this question must be faced, and can indicate with reasonable clearness what the national desire is, our State and national legislators will act as we wish. It has ever been so, and

it can never be otherwise. Hence, then, this cause is in our own hands. If we believe in forest protection and forest restoration, the only thing for us to do is to agitate, and agitate until we are heard, and to organize into town, county, state, and national forestry associations that our agitations may be effectual. There never was a time when such organization was more hopeful than now. Politically we are almost without leading issues. It is hard for the dominant parties to tell upon what they differ, except that one has the offices and the other desires them. The irrigation question, so intimately associated with the forestry movement, is fairly before the people of the West. And if by concert of action we can now determine upon certain desirable points and move solidly over any considerable portion of the country towards these points, we shall either gain them, or at least gain such a vantage ground that those who are to come after us will accomplish all that we failed in doing.

The first preliminary then, appears to be knowledge:— an exact statement of what land we have in timber in the whole country. When Maine, Massachusetts, and New York go to Washington, and on the shores of Puget Sound obtain their ship spars, it is clear that this report must come from both the east and west. When Florida gives Michigan her hard pine in exchange for white pine, it is equally certain that we need statistics from both north and south. How fast is this timber being destroyed? How much do we need for the future to keep the springs of commerce in full flow, and how soon can we produce it? Only a National Forestry Commission can answer these questions. It should have means and time allowed to do it well. The question is too important for any subterfuges or make-believe examinations. Let us have the truth carefully and honestly stated. Then, and not until then, can legislation be intelligent, permanent, and productive. I believe that this Society might, without going beyond its legitimate function, examine carefully the forestry bill prepared by the American Forestry Congress at its last meeting, and, if approved, join its voice to ours in petition to our National Congress for its passage. The bill is as follows:

HOUSE BILL, 7026. Introduced by Hon. Mark H. Dunnell, of Minnesota, February 17, 1890.

A bill for the reservation and protection of forest lands on the public domain, and to establish a commission to examine into the condition of the said lands and to report a plan for their permanent management.

Whereas, the permanent preservation and proper administration of a sufficient forest area, especially upon mountain slopes and about the head-waters of streams, are absolutely necessary to preserve and regulate the water supply, and to protect the agricultural interests of a large and rapidly increasing part of the population, as well as to provide an adequate timber supply for the same for all future time, and to prevent destructive recurrences of drought and flood; and

Whereas, the forests upon the public lands of the United States are being rapidly destroyed by the ravages of fire, and by reckless cutting of timber both with and without authority,

Therefore, be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the unsurveyed public lands of the United States embracing natural forests, or which are less valuable for agriculture than for forest purposes, and all public lands returned by the public surveyors as timber lands, shall be and the same hereby are withdrawn from survey, sale, entry, or disposal under existing laws, except as hereinafter provided, nor shall any timber be cut or removed from the said lands except for the actual needs of persons upon the said lands, engaged in carrying out the purposes of this act.

SECT. 2. That during such period as this act shall remain in force, the President of the United States shall, on request of the Secretary of the Interior and the Commission to be appointed under this act, designate a portion or portions of the military forces of the United States to guard all or any part of the lands reserved as aforesaid, and the timber growing thereon, from fire, theft, and use by unauthorized persons.

SECT. 3. That the President shall within a reasonable time after the passage of this act, appoint, by and with the advice and consent of the Senate, three persons possessed of a knowledge of the needs and uses of forests, who shall constitute the United States Forest Commission, and shall hold office until this act is

superseded by an act providing for the permanent administration of the forests upon the public lands, or is repealed. The President may remove any commissioner, and any vacancy in the commission shall be filled by him as is provided in the case of the original appointment.

SECT. 4. That the duties of the said commissioners shall be to personally examine the lands reserved as aforesaid, so as to determine what part or parts of the said lands ought to be permanently kept in forest, and to keep themselves constantly informed as to the condition of the same, and on or before the opening of the second session of this Congress, to present their report to the President for transmission to Congress, stating in full a plan for the proper management of the forests upon the said lands, and the said commissioners shall make such further reports from time to time as they may deem necessary until this act shall be repealed or superseded as aforesaid.

SECT. 5. That the said commissioners shall be authorized to contract on behalf of the United States, for the sale to responsible parties, at a reasonable price, of such wood and timber as may be needed for immediate use in the localities adjoining the said lands, subject in every case to proper regulations, to be made by the said commissioners, with regard to the size and character of trees to be cut, the places where they are to be cut, and the means employed in cutting them.

SECT. 6. That the said commissioners shall each receive a salary of three thousand dollars per annum, and shall be paid their necessary travelling expenses incurred in the discharge of their duties as commissioners. The commission shall be provided with an office in the Department of the Interior, and shall be authorized to employ a suitable clerical force.

SECT. 7. That all acts and parts of acts inconsistent herewith be and the same hereby are repealed; provided, however, that nothing in this act shall in any way interfere with any reservation of the public lands heretofore made, or which shall hereafter be made, by the Secretary of the Interior for the purpose of irrigation, or with any use made of the same for that purpose.

MEMORIAL OF THE AMERICAN FORESTRY ASSOCIATION.

To the Senate and House of Representatives of the United States of America:

At the eighth annual meeting of this Association, held in Philadelphia, October 15 to 18, 1889, the following resolutions were adopted:

Resolved, That we respectfully petition the Senate and House of Representatives of the United States to pass an act withdrawing temporarily from sale all distinctively forest lands belonging to the Government of the United States, as recommended by the Secretaries of the Interior during the past three administrations, and providing for their protection, and authorizing the employment of the army, if necessary, for this purpose, until a Commission, to be appointed by the President, shall have made such examination of the forests on the public domain as shall be necessary for determining what regions should be kept permanently in forest, and shall have presented a plan for a national forest administration.

Resolved, That we also petition the Senate and House of Representatives to authorize the President of the United States to appoint a Commission for the purpose of examining the forests on the public domain and reporting to Congress a plan for their permanent management, and that Congress make the necessary appropriations for such Commission.

The reasons for our urgent petition for the passage of these measures is briefly this, that, in the opinion of all those who have investigated and considered the matter, these measures, or others equally radical, can alone secure the magnificent forests upon these lands from destruction by axe and flame within a comparatively short period.

What the result of such destruction would be, may in some measure be realized by considering these forests from three points of view.

First. They are valuable parts of the property of the nation. Though far less extensive than formerly, they still cover from 50,000,000 to 70,000,000 acres. They are too valuable, merely as present property, to be neglected, left to the timber thief to carry off or the chance fire to burn down.

Second. They will be needed as an important source of timber supply for the Western States for all time to come. If the population of this country is to continue what it is now, to say nothing of its probable great increase, these forests must always be looked to to supply the people of a vast region with timber for buildings, railroads, mining, and many manufacturing industries. Any serious diminution of this supply, owing to deforestation on a large scale, would prove a serious check to the prosperity of the Western States.

Third. The greatest value of these forests to the present and future inhabitants of the Western States is in the assistance they render to agriculture through their influences on the water supply and the climate. The mere loss of national property, though measured by millions, can be endured. The absence of a timber supply at home can in a measure be made up for by purchases from more prudent foreigners, and by the substitution of other materials in the place of wood products. But there is absolutely nothing, natural or artificial, that will take the place of the mountain forest as a regulator of rainfall and water supply. Every inland region without forests is a region of long droughts, varied by destructive storms. Every mountain region without forests is a region whose streams, instead of watering the valleys below with a constant adequate flow, alternately dwindle into insignificance and swell into raging torrents, not only flooding the country, but covering it with rocks and sand from the mountain sides. Great as is the damage caused by the loss of mountain forests, to a region naturally well watered, it would render agriculture impossible in that extensive district which has so recently begun to be rendered fertile by the use of irrigation. No system of reservoirs, even the most costly and ingenious, can take the place of the forests on any large scale. The most that it can do is to co-operate with them.

It is respectfully suggested that the true value and use of these mountain forests has never been properly considered by this Government. It has apparently never realized that mountain forest land differs from all other land in this important respect, that its condition cannot substantially be changed without disastrous results; that it must, for the sake of the properly agricultural land, always remain in forest. On the contrary, it has been sold and given away like other land without any restrictions whatever

upon its use in private hands, although the experience of every nation shows that the national government alone has the power and the means for the best forest management, and that its power must be exerted even over private forest property in order to prevent disaster to the community from the action of individuals.

Timber cutting has been permitted on the lands yet unsold, but under impractical restrictions as to use, without any regard to proper methods, and with no compensation to the Government. The necessity of timber as an article of merchandise, and the impossibility of obtaining it legally from the public lands for that purpose, have inevitably led to enormous thefts of timber and fraudulent acquisition by a few individuals and corporations of large tracts of land to which actual settlers only were legally entitled. While millions upon millions of dollars' worth of timber have been stolen, both for home and export trade, the pitiful sum recovered barely covers the cost of prosecution. Lastly, the utter absence of protection from fire has led to the destruction of enormous tracts which will very slowly, if ever, be covered again by a forest growth of any value.

The time has come when a change in these methods is absolutely necessary, and it is urgently called for by thousands of people whose future depends on a regular water supply.

While the immediate withdrawing of the public forest lands from sale and entry is absolutely essential as a first step to their preservation as forests, it will not of itself secure this end. The destructive fires and extensive thefts will go on as before. Still less will the mere reservation of the land enable the timber to be properly utilized. These lands must be *administered* — protected from fire, and the timber cut only when ripe and with a view to a constant new growth. Temporarily some portion of the army can be employed to guard these lands, until a practical system of administration, a common-sense application of scientific knowledge and the experience of other progressive nations to the needs of the place and the time, can be successfully inaugurated. The organization of such an administration can best and soonest be effected by a commission of competent men, appointed for the purpose.

That the evils above referred to are not imaginary but real, present, and constantly increasing, the memorials from the Pacific slope and the investigation of the Senate Committee on Irrigation

abundantly prove. It is impossible to over-estimate the importance of right action, and prompt action, in this matter, and that the Congress of the United States will permanently close its ears to the ever louder and louder cry of the people for forest preservation, this Association refuses to believe. With all hope, as well as earnestness, it prays your honorable body to enact such laws as the practical needs of the hour and a wise foresight of the future may dictate.

All of which is respectfully submitted.

JAMES A. BEAVER, *President of the Association.*
WILLIAM ALFORD, of California,
ABBOT KINNEY, of California,
EDGAR T. ENSIGN, of Colorado,
JAMES E. HOBBS, of Maine,
J. STERLING MORTON, of Nebraska,
WARREN HIGLEY, of New York,
CHARLES C. BINNEY, of Pennsylvania,
HERBERT WELSH, of Pennsylvania,
Committee.

Philadelphia, January, 1890.

Will you pardon me if I merely outline what we are trying to do in Pennsylvania, and indicate our methods, and state what our success has been? Four years ago some energetic, public-spirited ladies in Philadelphia undertook the organization of a State Forestry Association. There was almost no enthusiasm where they hoped to find it. In most places the project was met with coolness, if not with hostility, and even with sneers. But they persevered. A very modest little journal was started and freely distributed. The adjacent counties took up the work, and organized societies (which contributed toward the support of the journal), held meetings, and brought the subject before the people. Today we have an active membership of about one thousand. Other counties are organizing and the chances are that in a short time we shall be able to reach the active, broad-minded men and women in each county of the State. Thus, too, we are gaining a foothold in the public schools. Arbor Day ceremonies, even if they lead to the planting of but few trees, at least serve to enlist the teachers in our cause, and to impress the children with the idea that it is better to plant and care for a tree, than to destroy

it. There existed once a necessity for destroying forests that crops might be planted. This necessity has matured into an instinct so that the first natural tendency of the American lad is to cut or strike a tree. The tendency of Arbor Day then, is to lead to a change of sentiment among the young concerning our trees. This is one of the most hopeful signs. All that we have accomplished is not much, but if each State in the Union had a forestry association of a thousand members, and each such society were to join with the others upon a single point in forestry legislation to place it before our national Congress, the petitions would aggregate forty thousand names at least. It would be probably the first tangible sign to our representatives that we are in earnest, and would give them the desired reason for action on their part. There is no doubt of our ability to do all this by organized effort. It is further worthy of remembrance, that the hardest work is to *start* the movement; but this once done it must grow, because organizations increase more rapidly in proportion as they become larger and more numerous. A cause once made popular takes care of itself. An isolated National Forestry Association must attenuate its lines in the effort to cover so large an area as our national domain. Except here and there, *where it meets*, it carries almost no weight in an attack. But let a National Association grow out of State Associations and the case is different. It means united forces, solid lines, and weight in concerted action.

It remains to be stated, that the forces in favor of forestry are moving in the direction of State organization. New Hampshire and New York have already organized. Each State, too, is represented in its society by some of the most influential citizens and public men. Texas has just organized an Arbor Day and Forestry Association.

Dakota placed in her constitution a clause providing for a Forestry School. But there still remains much to be done. Even where state and county organizations already exist, the weight of increasing numbers is desired. No issue of the day is more directly for the people than this. It has not even a tinge of political coloring; it is simply and wholly a cause based upon right and expediency and in the interest of the future prosperity of the whole State and whole country. No people can more fully realize all this than the citizens of Massachusetts, where so many

great movements have originated and whence they have spread as blessings to the whole country.

Quite aside from the general problems to be placed before our National Congress, are the minor ones which grow out of the condition of each State.

For Pennsylvania there would at once arise the question: Shall the Commonwealth own the waste ground,—the timbered areas on the chief water shed of these States? If so, what steps shall it take to secure them, without excessive cost on the one hand, and without injustice to the owner on the other? The general tendency of American thought is toward the belief that the individual will in future tolerate less and less meddling by the State with his affairs. It is because of this fact then, that I think the only way the State can protect itself is by owning the needed watersheds, obtaining them by purchase if need be; or, if this be not possible, by taking them as a city takes ground for a park, or as a railway company takes the land needed for its road-bed. I can see no new principle involved here. If a State can grant to a private corporation the right to take and use private property for public benefit, it is strange indeed that it cannot claim the same right for itself. How can it give a right which it does not itself possess? New York has already decided this affirmatively. I am convinced that, for us in Pennsylvania, the most pressing demand in the interest of our forests is removal of taxes on land so long as it remains in timber, or, if the owner is to be taxed, it should only be on the timber which he removes, and from which he derives a revenue, or an actual benefit.

Consider the case for a moment! We are told, the owner holds these lands in timber because of a prospective higher value, and that he is simply paying for the protection the State renders while he waits. Now if this were true,—and it is not, for the State fails to protect him,—the fact remains that the State is year by year reaping from these forests a benefit vastly in excess of what comes from taxes, but the owner receives nothing. In places where his timber is remote from market the only exclusive privilege remaining for him is to despoil the commonwealth of trees that were more needful to it than they could be to him. But the principle is wrong. Such taxation is neither equal nor proportionately equal. It is, when reduced to its simplest expression, a tax upon the owner for being a public benefactor. His trees purify the air

— for the lungs of the citizens in an adjacent county it may be — and the water collected and stored turns the factory wheels or enters reservoirs a hundred miles away. But the owner, receiving at most only his share of these blessings, must pay the whole tax. I object then to that woodland tax, on the very ground of its inequality. But the principle is wrong in another way. Thus the idea of taxation is, I think, based not on property as such, but on the benefits derived from it. An authority says, "all tax must ultimately come from rent, profit, or wages." But the owner of the unused timber land is receiving neither rent, profit, nor wages. How then can he be justly taxed? Lastly, I object to a tax on timber land because it not only puts a premium on removal of the trees, but, in some instances, as for example that given by Senator Sawyer, actually necessitates clearing away the timber and leads to subsequent abandonment of the ground. I cannot give an exact estimate, but think I am safe in the assertion that in Pennsylvania there are about two thousand square miles of land absolutely worthless for all agricultural purposes, and where our most important streams head. For all that vast area there is but one natural destiny, the production of timber and the conservation of water. Now the State should either own it all, or remove the taxes from it. I do not think that Pennsylvania stands alone. From a paragraph written as early as 1846, by Mr. George B. Emerson, when treating of the Rock Chestnut oak, I think, Massachusetts has also some similar areas. I quote the passage: "But the chief recommendation of the rock chestnut oak, is the situation in which it grows. It grows naturally and flourishes on the steep sides of rocky hills where few other trees can thrive, and where the other kinds of oak can hardly get a foothold. There are, probably, thousands of acres of hilly, rocky land, in almost every county in Massachusetts, where various kinds of evergreens have grown, unmixed with deciduous trees, until they have exhausted all the nutriment suited to their support, and where now, consequently, nothing thrives, which ground would furnish abundant support for this kind of oak." This was written forty-four years ago. You can say better than I whether the condition of affairs has improved in the meanwhile, and what is the proper legislation, if any be needed, for such areas. Only allow me to suggest that you do not, in any way, encourage the owner to despoil the commonwealth.

There is, it appears to me, a point to be brought out here in this particular locality. Do you do enough of tree planting? I ride along the great railroad thoroughfares of the State, and find too frequently, in towns and town surroundings, that the aspect is rather that of scarcity of trees, when I regard the country from the stand-point of landscape gardening. It appears clear to my mind that the tendency should be rather toward superabundance of trees. I do not suggest that your roads be literally lined by trees, or your many beautiful vistas be closed by masses of foliage. This would be a mistake. It would give you a country quite as monotonous as the other extreme. My suggestion is that you should consider this whole region adjacent to the city, as one vast suburban park, to be laid out as a park, where the whole, so far as may be, should be under one leading plan or idea of landscape gardening. A clump of oaks here, of elms there, of pines or spruces yonder, but each on the soil and location best suited for an enduring, vigorous life, so that you may have the fences and unsightly diseased trees removed. Above all, plant almost exclusively our native trees, for, as Professor Sargent has clearly shown, they are by all odds the longer lived.

It would appear clear that if the State is justified in over stepping the rights of private property to ensure an actual benefit, so too, it might be equally justified in according special privileges or special rewards to guard against public calamity. I make this statement as preliminary to the suggestion that it might be well if more general bounties than have yet been offered for tree planting were allowed by the State to such regions as that of Cape Cod. The question has risen more than once with me, as to whether the removal of trees from that sandy projection has not been followed by a fiercer and more disastrous sweep of the winds than once existed there. It would appear as though this idea could find some support from your local history and tradition. Near Cape Henlopen, the moving of an immense sand dune threatens to be a very serious matter for the future, unless measures are taken to arrest it. Within the brief period since the settlement of the country such changes have taken place in this moving mass as to indicate with some certainty, that it may prove a formidable foe in the future. How many other such illustrations the coast would furnish, it is hard to say, but probably enough to merit attention from our legislators, and appropriations from the States interested.

At the present juncture there is quite another aspect to this tree planting. Disguise it as we may, the unpleasant fact remains for our contemplation, that there has been a marked fall in the value of farm lands. We need not inquire how this has come about. It were better and more appropriate to our subject to inquire what shall we do under the circumstances. Probably nowhere in this country, unless we except some small areas where market gardening is carried on, do we make the most out of our acres. Compare Massachusetts or Pennsylvania with Belgium, and I think the case will be a clear one. This leads to the inquiry: Have we not been dissipating our energies over too large an area in all agricultural work? Should we not have gained more by careful culture of ten acres, than by slovenly treatment of twenty? Indeed, would not the smaller area, so treated, have been both more productive and more cheaply managed? If the question should receive, as I am inclined to think probable, an affirmative answer, then the conclusion follows, that there would remain an equal area for some other use. Land in cultivation tends, on the whole, toward impoverishment. It requires constant use of fertilizers. But land in forest tends toward increase of fertility. The annual fall and decay of foliage returns to the soil not only as much nutriment as the growth of the trees removed from it, but more. My suggestion then is, unless some better plan be offered, that on those unused acres trees should be planted. Suppose you are to use the land in ten years. If you plant judiciously, in that time your young shoots will be large enough to pay for removal, and the soil will have been enriched by the leaves they have furnished. It cannot be that this depreciation of farm land is to be permanent. In the not distant future the available desirable locations of the West and South will have been taken up, and the wave of home-seeking humanity, which has so long been moving westward with a force as resistless as the waves of the Atlantic, will, like those same waves, flow back toward the East, and mingle again with the masses from which they originally came. Happy he who then has a surplus holding here!

At the close of Professor Rothrock's lecture, a vote of thanks for his interesting and instructive paper was unanimously passed.

Discussion.

O. B. Hadwen expressed the exceeding gratification afforded him by listening to Professor Rothrock's lecture. He believed the present forestry agitation might prove of great benefit to New England. There used to be dry times when the country was, so to speak, completely covered with forests, but there was comparatively little barren land.

There is more forest in Massachusetts today than there was fifty years ago. This is partly due to the desertion of farms, which have naturally become wooded again, but in part also to this forestry agitation, which was begun more than half a century ago, and has been persistently urged by wise, far-seeing men.

No doubt other material for buildings has been used in consequence of the exhaustion of native pine. So also in the matter of fuel; farmers, as well as residents of cities, now use the coal of Pennsylvania, instead of the products of their own woodlands, for home comfort.

He believed that as a result of the spread of knowledge of the principles of scientific forest culture, we shall yet grow timber, largely increased in size, and, through early pruning and thinning, now little thought of and rarely practised, the amount of clear lumber in the forest product will be greatly increased.

Because of ignorance of the science involved, there is no enthusiasm among our farmers, in this branch of their business. They are too eager to turn into money everything available in that direction, and will sell their pine trees as soon as they are sufficiently large for box boards. A wooden house is the best in this State, because it can be kept dryest and therefore most healthful. He hoped the time would come when the Commonwealth and the towns would relieve owners of woodland from excessive taxation.

John M. Woods said that he was much interested in the subject before the meeting. For twenty-five years he had been a dealer in hard wood lumber and he had learned considerable about it. He thought the policy upon which the saw-mill business had been permitted to go on in this country illustrated the point about locking the stable doors after the horse was stolen.

Prior to twenty-five years ago Albany was a centre of the lumber trade, but about that time, Cleveland, Ohio, came to the

front, and as time rolled on Indianapolis, Ind., and Nashville and Memphis, Tenn., became prominent markets for lumber. There never was a time when the beautiful woods of our land were in greater demand than now, nor a time when they commanded higher prices. They are largely used in the finer finishing of house interiors, and in furniture. They include chiefly black walnut, oak, ash, butternut, cherry, sycamore, etc. Certain kinds, particularly curly grained woods, are in special demand, and to meet these calls the oldest and largest trees, which were considered best, were cut first and put into market. All parts of the country have been thus denuded of the best. The white-wood comes from the South. The Cumberland and Smoky Mountain ranges, and the elevated lands of Arkansas are rich in choice varieties of woods. They have been scoured for their best, to meet the demands of our markets. There was a time when the best black walnut boards, two feet wide, went begging at forty-five dollars per thousand feet. Now, the price of such lumber is one hundred and fifty dollars per thousand, and it is almost unprocurable at that. Others of these choice varieties are also chiefly found only in narrow widths. Probably the appreciation of these woods in European markets helped to increase the demand for them here. The destruction of forests began with the settlement of this country, therefore our own State was an early sufferer. Mr. Wood stated that within a radius of eighteen miles from our State House, there is not now standing, a tree which would make a saw-log, except some growing on private grounds as ornaments. The destruction has been extended by saw-mill men all over the country. Lumbermen, *i. e* dealers in lumber, are becoming anxious to have measures adopted to check the wanton waste of our forest wealth. Arbor Day was suggested as a method of cultivating the public taste for tree culture, and the speaker urged that every one should make it an act of duty, if not of pleasure, to plant one valuable tree,—a black walnut, cherry, ash, white oak, or any that is used in manufactures. It will constantly be a thing of beauty and pleasure, and eventually of profit if need be. Although he has only a small city lot, he set out a black walnut tree a few years ago. It makes an annual growth of four feet and has become the admiration of the whole neighborhood. In Somerville, where he resides, many streets pass over hills. Where there are no trees, the rains wash the streets badly, and

they are quickly dried to dustiness afterward. Those streets shaded by trees suffer far less by rains, and are not so dusty as the others. On this ground he claimed that trees are a protection to the road-bed, and that it is economical to plant trees on the streets, because it costs less to take care of streets so adorned.

John D. W. French spoke of the subject as being broader than usually came before the Society for discussion,— it is as broad as the land itself. It is a question of the most vital importance. If the forests in one section of the country are devastated by fires, or unnecessarily destroyed by the axe, all sections suffer in more or less degree.

Figures are suggestive and carry weight, but are often not as impressive as the words of a living witness. At the last Forestry Congress, in Philadelphia, Richard J. Hinton, who had accompanied the Irrigation Commission the previous summer, stated that they travelled thousands of miles through burning and burnt forests, where the smoke was so dense as to fairly obscure the sun. And then, in one of the most eloquent addresses that Mr. French had ever heard, he set forth in glowing words, the iniquity and wickedness of our present system of forestry administration, with its wholesale destruction of timber by fires and lumber thieves.

Something can be done to stem this tide of destruction before it overwhelms all our forests, by agitation at home, in the newspapers, and by bringing to bear, all influences possible, on our members of Congress, to persuade them to pass suitable forest laws. Professor Rothrock had suggested the formation of a State Forestry Association here, similar to the one in Pennsylvania. It may be well, sometime in the future, to form one. It is possible that the objects in view can be accomplished by existing societies, like the Massachusetts Horticultural Society, the Massachusetts Society for Promoting Agriculture, the State Board of Agriculture, and the Massachusetts Agricultural College.

There are at present in our State, various laws bearing on the forestry question, such as exempting from taxation plantations of trees on land of low value; to prevent fires, and for the punishment of offenders; to allow towns to assess on polls a certain sum, not exceeding fifty cents each, for the planting of trees on public squares and highways, and also to protect trees from wanton and malicious mutilation.

Mrs. Henrietta L. T. Wolcott said she knew very little about this subject except from experience in her own grounds. In 1877 her husband bought a farm of four hundred acres. There was a sandy, gravelly hill-side directly opposite the house. It was found unprofitable to cultivate that land, and she decided to devote it to trees. Ten thousand little trees were ordered; they were so small as to come packed in one champagne basket. She asked to have furrows ploughed for the proposed rows of trees, but the whole ground was ploughed. This was a useless operation, and in a sense was discouraging However, she planted all those little trees, but the first rain that fell washed many of them out of the rows. Among these trees were two hundred seedling pines, about two and a half inches high. When the ash and larch trees were four feet high, they were thinned out, some of them being transplanted to afford future shade to the dairy building. In a few years the trees had grown so large they could not be dug up. Some of the larches are now fully thirty feet high. The hill-side is covered and is an agreeable sight. The soil has been greatly improved, being now about twelve inches in depth instead of three inches as before the tree planting. Mrs. Wolcott said that in many places the work of the Village or Town Improvement Society was largely left to the women members. She recommended the planting of trees as a most appropriate work for such societies, but she thought it better to use larger trees than those with which she began. One foot high at least would be small enough. Still, she would suggest that some members raise stocks of trees from seed; this would give them a choice in the selection of varieties, and they could be used when grown to any desired size. She would also recommend that individuals plant trees, either seedlings of their own raising or purchased from nurserymen. In this way, a great deal could be done to beautify the country, and make it more attractive and pleasant for generations to come.

Leverett M. Chase regretted that the time did not permit a fuller discussion upon this matter. Professor Rothrock's valuable paper had covered but a few of the elements in this theme. One is the relation of freshets and floods to the destruction of forests, to which we are compelled to give attention by the most disastrous experiences throughout the country. For example: in Ohio forests occupied 13,991,228 acres in 1853; 9,749,333

in 1870, and 4,732,092 in 1880. From 1870 to 1881 the clearing was 5,041,086 acres, or 799,192 acres more than the total forest in 1881. At this rate a single decade would deforest the State and leave a large deficiency to be supplied from other States and Canada. In 1883 the damage by floods in the Ohio basin alone was more than $61,000,000. Has the removal of forests from the vicinity of many of the tributaries of the Ohio River had any influence in precipitating all this excess of water from those districts into the streams? Would not the restoration of forest growths tend to retain more or less of that moisture where it fell, or at least to cause it to pass away more slowly, and, to a greater extent, discharge its natural functions, to the advantage of the annual crops, the live stock, and local navigation, and render it a benefit in every way to the people, instead of the terrible scourge it has been in later years?

BUSINESS MEETING.

SATURDAY, March 8, 1890.

An adjourned meeting of the Society was holden at half-past eleven o'clock, the President, William H. Spooner in the Chair.

Charles N. Brackett announced the decease of George Hill, and moved the appointment of a committee to prepare a suitable testimonial. The motion was carried and the Chair appointed as that Committee, Mr. Brackett, Henry W. Wilson, and Warren Heustis.

The Secretary read letters from the Bay State Agricultural Society and the Worcester South Agricultural Society, expressing the thanks of those Societies for the invitation to appoint a member who should have the free use of the Library and Library Room during the year 1890, for the purpose of preparing papers to be read at Institutes of those Societies, and announcing that they had respectively appointed George M. Whitaker, of Southbridge, and George L. Clemence, of Globe Village.

A letter was also read from the Hingham Agricultural and Horticultural Society, conveying the thanks of that Society for a similar invitation, and stating that an appointment would be made at an early day, of which the Society would be notified as soon as made.

Adjourned to Saturday, March 15, at half-past eleven o'clock.

MEETING FOR DISCUSSION.

Heating Cold Frames by Hot Water or Steam Pipes, and Growing Black Hamburg Grapes Under Glass that is Otherwise Used in Winter.

By William D. Philbrick, Editor of the Massachusetts Ploughman, Boston.

Five years ago I made my first experiments in growing dandelions in a frame heated by a circulation of hot water.

The bed was one hundred and ninety-five feet long and twelve feet wide, covered by one hundred and thirty sashes, and was heated by one and a quarter inch *water* pipe, supported on the inside of the plank frame four inches below the glass, which was covered at night by straw mats in cold weather. This season has been so mild that no mats have been required.

The dandelion roots were transplanted from the field in September; the glass was placed on the frame about the middle of December, and the firing of the boiler was begun about Christmas.

The dandelions were marketed in February, producing an average of just a bushel to each sash, and were cleared off before the crop from the cold frames came in.

As fast as the dandelions were cleared off, the bed was sown with radishes, with every third row Short Horn carrots; the radishes were sold in April; the glass was then taken off to another frame heated by manure for cucumbers, and the carrots were marketed in June. The result was highly satisfactory.

The next year I repeated the experiment, using, however, a single one and a quarter inch *steam* pipe on the south side of the bed twelve feet wide. The dandelions near the steam pipe were somewhat drawn by the excessive heat of the pipe, but were not much injured. Instead of carrots, I sowed parsley with the radishes this time; and it came to market in May and sold

remarkably well. I have continued to use these warm frames every year since, with uniformly successful results, as regards growing the crops, though of course the market is not always equally good for the products.

For the best and most easily managed frame I prefer one only six feet wide, with a fence to lean the mats against when not on the frame, having a one and a quarter inch pipe carried around the frame, on both sides, four inches below the glass, and heated by a small hot water boiler, under pressure of about ten pounds to the inch. The reason for preferring hot water circulation to steam is that in moderate weather the temperature can be more easily regulated by regulating the fire, than by steam pipes. The same results could probably be attained by having two or three steam pipes of less diameter, and shutting off the steam from part of them in mild weather.

These frames are very convenient in growing the crops I have mentioned, which need to be grown in the open air in spring and fall without glass, the frame and glass being placed over the bed as cold weather comes on, thus avoiding transplanting, and they would answer equally well, I should judge, for many flowering plants of low growth, which need but little artificial heat, such as violets, pansies, primulas, and many of the Dutch bulbs.

It is astonishing how little coal is required to keep out frost, which is about all that is needed with such hardy plants as I have mentioned. When mats are used on the bed, it will require for a bed two hundred feet long and six feet wide only about three or four tons of coal for the winter, to keep the plants in growing condition, and make the frame produce fully double what it would do without the heat. Every one who has attempted to run a cold frame in a severe winter, knows how hard it is to keep out frost, even with double mats and shutters. By the aid of hot water or steam, no shutters at all are required, and much of the time not even mats. Such an arrangement, however, will not grow good lettuce, without a little bottom heat in cold weather.

Growing Black Hamburg Grapes Under Glass that is Used for Other Purposes in Winter.— Every market gardener knows that there is usually a considerable number of hot-bed sashes in every market garden which are not used, unless for growing cucumbers and melons, after the middle of April, till the next winter. The early cucumber crop has of late years been far less profitable than formerly, and it occurred to me a few years

ago that, possibly, this glass might be put to better use in growing grapes. To do this, I started some cuttings of the Black Hamburg grape, and grew the vines for the first year in pots in my cucumber house. The next year they were set out in the border where they were to grow and were grown in a frame, raised three feet high and covered by a single string of hot-bed glass the vines being trained inside the frame. The vines were cut back in the fall to two eyes, and covered. The next spring the rafters of the house were built and the glass was put on about the last of April.

The vines made a fair growth last year, and were allowed to ripen only a few bunches of grapes. But next summer I hope to be able to grow a fair crop. The glass with which this house is covered is ordinary hot-bed sashes, which are fastened to the rafters by means of screw-eyes in the rafters, through which common wood screws pass into the under side of the sashes to hold them in place. The glass is taken off in the fall, after the vines have been pruned and laid down and covered with earth. The glass is used on hot-beds or cold frames till April 20, when it is replaced upon the rafters of the grapery, just as the grapes are breaking into growth. The grapes treated thus will ripen in September. I see no difficulty in growing grapes in this way very cheaply. When I made my plans for this operation the price of Black Hamburg grapes was from seventy-five cents to one dollar and a quarter per pound, but the recent large importation of California grapes in the fall, together with the improved excellence of our out-door grapes, has reduced the price, so that Black Hamburgs sold last fall at about thirty cents per pound. This low price was partly due to the wet season, which made it impossible to hold the grapes for later marketing.

I do not, therefore, regard this experiment as likely to prove a financial success, but any one who wishes to grow these delicious grapes cheaply, can do so by using his spare glass, and will be rewarded for the care they require, with a crop of choice fruit for his table or for his friends. There is, however, little inducement to grow them for market, unless they are forced early, or held till cold weather, which involves the use of heat and different arrangements.

The span of the house is about twenty-four feet. The rafters are eighteen feet long, inclined at an angle of 45°, and are pre-

vented from spreading by horizontal ties fastened about midway of their length. This length of rafter requires three lengths of sashes, each one slightly overlapping the one below it. Every third upper sash on both sides is hinged at the top so as to be opened for ventilation, and there are also ventilators in the sides, which, however, are opened only when the grapes are coloring. The perpendicular sides are about two and a half feet high. The ground in the house is a foot or a foot and a half below the border, the soil having been thrown on the border. Telegraph wires are stretched, about fifteen inches from the glass, to bolts at top and bottom, by means of which they are tightened, and they have also a support in the middle; on these wires the vines are trained. Perhaps a better plan would be, to carry the roof only about half as high, on the curb-roof plan, having the upper portion pitch just enough to shed water freely. This would make the working of the upper portion of the house less difficult.

A vote of thanks to Mr. Philbrick for his able and interesting paper was unanimously passed.

Discussion.

E. W. Wood was first called on, and said that he had been much interested in the account of the use of heat in frames. Within the last few years a good deal has been done by procuring the old heating apparatus used in railroad cars. This has, in consequence of the change in the methods of heating, been sold for eight or ten dollars cash, and has been purchased to a considerable extent by the users of cold frames. Lettuce has, as the essayist said, failed without bottom heat. The heated frames are most useful for retarding plants.

As to using the hot-bed sashes for grapes, Mr. Wood thought it a question whether it would be more profitable than continuing to use them for cucumbers or other vegetables. There is no fruit which will flourish under maltreatment as well as the grape. When the tops of Black Hamburg vines are destroyed the roots are never killed. The vines under Mr. Philbrick's plan must be bent down and covered with earth to protect them during the winter; this can easily be done for the first four years, but after that it will be more difficult. The speaker has vines planted in

1871, some of which are four inches in diameter at the surface of the ground and they cannot be bent down without injury.

Mr. Philbrick said that the necessity for warming the earth in frames depends on what plants are to be grown. Lettuce and cucumbers must have bottom heat; dandelions, parsley, and radishes are more hardy and do not require it: in fact they do better without it.

William H. Badlam thought that warming frames, as proposed by the essayist, would be liable to make plants more delicate. He thought steam would not give heat so quickly as hot water nor retain it as long. The water begins to warm the house as soon as it gets into circulation and does not lose its heat until the fire goes out. He also thought steam less economical than hot water.

Mr. Philbrick's experience did not agree with Mr. Badlam's. He built a large house which he heated at first with hot water and afterwards with steam, and since then another, and he had found it decidedly more economical of labor than hot water. You can get up heat with steam more quickly, because the quantity of water to be heated is much less. At this time of the year you do not want heat during the day, and the pipes are much more quickly cooled when steam is used than with hot water. As to the danger of the fire going out, it does not amount to anything; he leaves his fire for ten hours. In a small house he would prefer hot water.

Mr. Wood gave an account of an experiment, made at the Agricultural Experiment Station at Amherst, to determine the comparative advantages of steam and hot water. A house eighty feet long and forty feet wide was built with a partition in the centre, one-half being heated with steam and the other with hot water, and two boilers exactly alike were put in. The only difference was that the side heated by steam was protected by a bank from the east winds, while the other side was exposed to the west. The coal was weighed every day, and it was found at the end of the season that, notwithstanding its exposure, a ton of coal had been saved in the part warmed by hot water, and the heat kept higher. This experiment was made by persons who were impartial and unbiassed. There may be conditions and circumstances where steam can be used advantageously. The Messrs. Hittinger Brothers, at Belmont, have a house 600 feet long, one-half 25 feet wide, and the other half 30 feet, and four houses 150

by 30 feet, in all which they use hot water. For small houses hot water is safer. Steam must be constantly watched. He thought the essayist would not say he could heat by means of steam with as little coal as with hot water.

Mr. Philbrick thought that if Mr. Wood got used to steam he would feel as much confidence in it as in hot water. He had not kept an exact account of the cost, but he keeps his houses warmer by the use of three or four tons more of coal than was used when he heated the same houses previously with hot water.

William E. Endicott thought it would not be safe to draw final conclusions from the experiment at Amherst. That experiment, of itself, is of trifling importance. It merely shows that one style of steam-boiler cost more to run than one kind of hot water apparatus in one trial.

Mr. Wood said that it was intended to test the whole matter as impartially as possible. The boilers were alike and were put in by the same dealer, and there was no difference between the two houses except the location.

Mr. Endicott said that the question is too large to be settled by a single experiment.

Joseph H. Woodford said that the method of raising Black Hamburg grapes, recommended by the essayist, had been practiced in England many years ago and illustrated in the English horticultural magazines. The houses were called "curates' vineries." Plans of the construction of these vineries are given in Thomas Rivers's "Miniature Fruit Garden." The late Stiles Frost, of West Newton, used sashes about three feet wide, resting on bricks at the base, and fastened together at the apex with hooks and staples. The vines were planted at the south end, and as they grew were suspended from the ridge of the sash. They produced large crops of grapes. In the fall the sashes were removed, and the vines buried until warm weather came in the spring.

Mr. Wood said that such houses as the last speaker had described were used and recommended by Thomas Rivers. The houses were twenty-six inches high, two feet and a half wide, and seven feet long, without ends, so that they could be extended by placing in line. This had been done to the extent of seven houses. One vine produced sixty-three bunches of grapes. Those used by Mr. Frost cost seven dollars each. It is difficult to keep the vines within the bounds necessary for so small a space, but crops can be grown with little care and expense.

The announcement for the next Saturday was a paper on "Horticultural Education for Children," by Henry L. Clapp, principal of the George Putnam School, Roxbury.

BUSINESS MEETING.

SATURDAY, March 15, 1890.

An adjourned meeting of the Society was holden at half-past eleven o'clock, President William H. Spooner in the Chair.

Charles N. Brackett, Chairman of the Committee appointed at the last meeting to prepare a memorial of George Hill, reported as follows:

The committee appointed to prepare resolutions on the death of George Hill, report the following:

It is with feelings of sincere sorrow that we record the death of our esteemed associate and friend, George Hill, which occurred suddenly on Saturday morning, March 1st, at his residence in Arlington. The suddenness of the event has not only thrown around it a more than ordinary solemnity, but has made it difficult to realize that he, who but a few days ago was in our midst actively engaged in the duties of a busy life, should now be numbered with the dead.

Mr. Hill commanded the respect and esteem of all who knew him, and in saying that his death is a public loss we are only expressing what hundreds of hearts have already declared. He was possessed of a noble, generous character and personal traits which made him very popular, and he will be missed by a large circle of friends who were warmly attached to him.

For a period of more than twenty-five years he was a constant and valued contributor to the Society's exhibitions. As an exhibitor of choice fruits and vegetables his contributions attested his enthusiasm and skill as a cultivator. He was a member of the Vegetable Committee thirteen years, and on various other Committees rendered the Society valuable services, neglecting no duty.

We cannot, therefore, permit this occasion to pass without placing on record some expression of our appreciation of his virtues and our high respect for his character and memory. Therefore

Resolved, That in the death of Mr. Hill this Society has lost one of its best cultivators and most respected members; one who always felt a deep and abiding interest in its welfare and prosperity.

Resolved, That, remembering his sterling worth as a man, his rare integrity and purity of character, his fidelity and generous hearted devotion to the interests and welfare of our association, our hearts are made sad by his removal from the scenes of his earthly labors. Though dead he still lives in the hearts of not a few, for he lived

"Scattering seeds of kindness
For the reaping by-and-by."

Resolved, That these resolutions be entered on our records, and that a copy be transmitted to the family of the deceased with the assurance of our warmest sympathy in their sad bereavement.

CHARLES N. BRACKETT,
HENRY W. WILSON,
WARREN HEUSTIS. } *Committee.*

The resolutions were unanimously adopted.

Edmund Hersey, Chairman of the Committee appointed some years ago to collect information in regard to Large or Interesting Trees in New England, stated that the Committee had collected considerable material, but they desired to make the work creditable to the Society, and therefore had had a circular printed asking for information on the subject committed to them, copies of which were upon the table for distribution to the members and others.

The Secretary presented a letter from the Spencer Farmers' and Mechanics' Association accepting the invitation to appoint one of their members who should have the free use of the Library and Library Room during the year 1890, for the purpose of preparing essays to be read at Farmers' Institutes, and announcing that Mr. J. G. Avery, of Spencer, had been so appointed.

Adjourned to Saturday, March 22, 1890, at half-past eleven o'clock.

MEETING FOR DISCUSSION.

Horticultural Education for Children.

By Henry L. Clapp, Principal of the George Putnam School, Roxbury.

In the paper which I am about to read I shall touch upon the following points:

1. Children's natural love for digging in the earth.
2. Why they lose that love.
3. The abandonment of farms.
4. The unfortunate results of our unbalanced system of education, in creating an overwhelming surplus of middlemen.
5. Studies that alienate scholars from Nature.
6. The influence of our text-books.
7. The need of scientific farming in the United States.
8. Some results of scientific farming.
9. School-gardens in Europe.
10. Results of instruction in school-gardens.
11. The introduction of school-gardens into our system of education.
12. What they should contain.
13. Their effect on the health of city children.
14. What horticultural socities can do to aid children in getting horticultural instruction.
15. The best educational impulses in this country come from private individuals and private institutions.

The child that does not like to dig in the ground is an exceptional one. We see the children of the rich spending their vacations in digging in the sands of the sea-shore; we see the children of the poor in the country digging caves in sand banks, making mud huts over their naked feet, and building dams for miniature mill-ponds.

Not unfrequently we come across a child's flower garden, carelessly cultivated, but strongly characteristic of childhood. Children take to earth as naturally as goslings take to water, and their liking for flowers is hardly less marked.

Why is it that so large a proportion of them grow away from such amusements soon after they begin school life? Why are most of our pupils so intent on getting into an office or a store, as

if either were a veritable El Dorado? Why is every avenue of business life crowded with middle men, commercial travellers, and non-producers of every description, while in every State farms are abandoned or worked under protest? I have cut the following paragraph from a newspaper of last December:

"In the rural districts in Wayne County, New York, there are no less than four hundred empty houses. It is a lamentable fact that the rural population of Wayne County is slowly drifting into the larger towns and cities, while many are going West in search of cheaper homes or fortunes. The town of Sodus alone has over fifty deserted houses, and Huron has thirty or more."

Without attempting to give all the causes for such a state of affairs, to a certain extent we may fix the responsibility upon our common schools, since they are organized, or have been until recently, for turning out scholars who are bound to be non-producers until they are educated differently. Our pupils apply for such positions as our schools fit pupils for. If nine-tenths of them aim to be traders, or actually become such, it is because our schools have fitted them better to be traders than anything else. If a farmer's boy becomes proficient in arithmetic, no one of all concerned considers such proficiency as an important factor in making the boy a superior farmer, but rather as evidence that he is destined by nature and education to a higher sphere of action than farming. His education, all the way through school, is of such a nature that its connection with farming is obscure, while its connection with the store, the office, or the agency is clear, and his aspiration to be a business man, a genteel trader, a book-keeper, or something above a farmer (as he thinks), is exactly in line with his education. In fact, with the farmer's boy, getting an education has come to be almost synonymous with getting away from the farm, since that is what really comes to pass. We estimate the influence of our schools by what the pupils have been and have done during a long term of years. Some studies alienate scholars from the cultivation of the soil and from nature generally, more than others. Where is the scholar who, once having entered upon the study of Latin, so full of halos, mirages, and expectations to the tyro, ever thought for a moment of earning his living by horticulture or any kind of farm work? Though the Georgics and Bucolics of Virgil describe the felicities of farming in the choicest Latin, they never influenced one student in ten

thousand to try to realize those felicities. So it is with the study of modern languages, mathematics, music, psychology, and literary work generally. They have no natural connection with the cultivation of the soil; they do not suggest it, and they too often preoccupy the mind to the complete exclusion of nature-studies.

The farther they are pursued, unless balanced by studies of a different character, the worse it is for the best interests of education,— the worse it is for our agricultural interests. If children pore over books all through the most impressionable years of their lives, even into the twenties, when students graduate from college, their faculties of observation and skilful manipulation become well-nigh atrophied, and the time when Nature can interest them has passed by.

That any of the graduates of our schools and colleges cultivate the soil, either for pleasure or profit, may be considered a piece of good luck, rather than the result of proper education. If even a living chance, or an open field, were given in our schools, for the consideration of topics which pertain to agriculture, such as plant life, insect life, rocks, and soils, there would be less injustice done to our great agricultural interests, and less injustice done to the rising generation of children throughout the land.

For years past we have been reaping the natural results of a system of education that, intentionally or unintentionally, turns all our young people for a livelihood toward the occupations of teachers, college professors, lawyers, physicians, clergymen, book-keepers, salesmen, musicians, artists, agents, and business men, under which head multifarious and heterogeneous legions of middlemen are pleased to class themselves. These men have had the control of educational affairs, and they have kept the schools turning out their kind so long that there is unquestionably in this country an overwhelming surplus of middlemen, non-producers, and men living by their wits. Such a surplus is certain to make trouble. All are determined to live in affluence if possible,— genteelly at all events.

Cities are crowded with middlemen. Thousands of men and women are constantly crowding into the cities only to get starvation wages, if they get any, and many spend all their hard-earned money seeking employment, and fail at last. Hoist a safe to an upper window and a hundred idlers will gather immediately. A

horse falls or a street becomes blocked, and a crowd of unemployed persons increases the blockade. Advertise for a competent person,— man, woman, boy, or girl, on a meagre salary, and the numerous applicants will show how overwhelmingly the occupations of middlemen are overstocked. There are various grades of the great army of the unemployed in any city, but most of them are a standing menace to the general welfare, and many, if not actually criminal, are always on the verge of crime, often by real or fancied necessity. These people have been educated in our schools,— educated to do what they can find no opportunity to do. Deals, trusts, syndicates, stock-gambling, colossal monopolies, lotteries, confidence games, and other so-called business operations, are the natural products of middlemen, using every artifice to beat each other, and make sales, and taking every possible advantage of those who really develop the resources of the country, — farmers, miners, mechanics, and producers of various kinds. Competition among middlemen may be the life of trade, but it has been death to many a farmer.

One of the principal causes of the present defensive movement on the part of farmers is middlemen. A million farmers, at least, in the United States, are now organized against middlemen and money-lenders. They say, "We must dispense with a surplus of middlemen,— not that we are unfriendly to them, but we do not need them. Their surplus numbers and their exactions diminish our profits."

Not only is this surplus of middlemen a damage to farmers, but to the financial standing and business reputation of the nation. The "Boston Herald," of January 1, 1890, contains a detailed account of the eight million dollars known to have been stolen by about two hundred middlemen, in positions of trust in this country during the year 1889. If those two hundred men had been influenced by our system of education to be good farmers, they would have added much to the happiness and prosperity of the country, and the disturbance to business enterprises and the distress to families, resulting from the stealing of eight million dollars, would have been prevented. We never associate these gigantic frauds with farmers, but always with traders. By the prevalence of such frauds we have earned the reputation of being the most fraudulent nation on earth. Our system of education, to begin with, and our hazardous tolerance of practically unre-

stricted and gigantic monopolies, furnish the conditions, if not the inducements, to frauds such as are seen nowhere else.

Unquestionably our system of education has been, primarily, a scheme for making money without much work with the hands. Hard-working parents make every effort to establish their children in a petty gentility, such as they themselves have never enjoyed. On all sides the demand has been for an education that will pay in dollars and cents, whether it pays in body and soul or not; good pay and little work, and that of a genteel kind, is the leading hope of such of our pupils as feel obliged to work; making a good trade, and getting something for nothing, animates the generality of people; and no talk about practical studies in our schools, has been untinged with the sordid spirit inherent in this nation, and inherent in its institutions; "Civilization is what education makes it," and we may expect to see our civilization taking low ground, when our education fosters, rather than seeks to obliterate, the love of money, or getting money without earning it. All over the land labor has been fighting against capital; the rich are growing richer on what they have not earned; many work in poverty that one may live in affluence; our graduates are gambling in stocks and bonds, and calling it business; men and women of excellent social standing are systematically investing in State lotteries; and all are imbued with that spirit which will be its own avenger,— that spirit which, in charity, is called practical. Even the text-books used in the common schools have a powerful influence mainly in the direction of those unfortunate conditions to which reference has been made. The gist of arithmetic is profit and loss, incomes, and stocks, and bonds, which are on the borders of margin and bucket shops, stock exchanges, and less respectable exchanges. Geography is taking on the commercial form more and more. Writing is extensively worked into commercial forms, business letters, book-keeping, answering advertisements for help, and applications for positions. All this swells the surplus of middlemen, a large proportion of whom have no natural aptitude for trade, but might become skilful producers, if properly taught.

Why have our educational authorities been so unmindful of this trend of our narrow system of education? If they have lately been aroused to their responsibilities, so far as to establish schools in which the principles of mechanics may be learned, what reason have they for stopping there?

Business men have complained through the newspapers and in many other ways, that the graduates of our schools are not prepared to take up the elementary stages of their business, nor to put on at once the habits of business men. Why should they be especially so prepared? Why have no similar complaints come from agriculturists, or manufacturers? Our schools should not be run in the interests of trade, any more than in the interests of agriculture or manufactures. The fact that they have been so run, makes them largely responsible for the unfortunate condition of affairs, to which reference has been made. In Europe, the schools are managed better. The principles of trade, mechanics, and agriculture, *all* come in for a fair share of school time; consequently the children are skilful workers as well as intelligent scholars. "Faith without works is dead." Books without works are no better. In view of what has been said it appears that a change in our system of education is of vital importance to agriculture, at least, if not to the best education of our children, and the highest prosperity and happiness of the nation. It is time to inculcate the dignity of *manual* labor, in the common schools, to teach children the value of property by making them work for it, to establish schools for manual training, and to give school children a piece of ground for observation, experiment, and work.

The introduction of horticulture into the common schools will do much to counteract those baneful influences that have been mentioned; it will create that respect for, and intelligent appreciation of, the cultivation of the soil, that is desirable; it will check the tendency to abandon the farm as soon as possible, if any educational means can; it will create a first love, to return to at a later period of life; and it will lead to a real demand for agricultural schools of a high grade. To expect agricultural colleges to flourish without feeders, is chimerical. Agricultural colleges and scientific farming on a large scale must start from plenty of seeds, planted in good soil and in the spring-time of life. The common schools, in an eminent degree, have the points of vantage for the prosecution of this work and there is need enough of scientific farming.

The "Boston Evening Transcript," of November 16, 1889, has the following comments on agriculture in America:

"There is no use in denying that our American agriculture is in a very primitive condition in all except the item of machinery.

Americans abroad sometimes laugh at what they are pleased to call the primitive methods of agriculture in Switzerland, Sweden, France, or Holland. As a matter of fact, our methods are primitive in comparison with theirs. * * * The Swiss, Dutch, or Swedish farmer recognizes the fact that the soil is the basis of all wealth, and is more important than any implements used in its cultivation. His methods of maintaining its fertility are as highly developed and perfect as the average American farmer's are primitive. In breeding profitable varieties of stock, too — varieties well suited to his purpose — he is far ahead of the American agriculturist. Our farmers, who are complaining almost everywhere of the decadence of American agriculture, could not do better than adopt some of these 'primitive' foreign methods."

Farmers who would be successful in these days, must know "how to feed the land while the land feeds them." Owners of land are increasing with astonishing rapidity, and the size of farms is diminishing; consequently land in the future must be made to yield more and more. It will yield more with better farming, and better farming will result from adequate facilities for teaching agriculture in the schools. How to produce much upon a small area requires study, and, other things being equal, children who receive proper elementary instruction in agriculture in school will be likely to acquire such ability at the most opportune season.

If such instruction were general in our common schools, the whole status of agriculture would be raised to a higher plane, better and more abundant products would result, and more lines of work allied to agriculture would be opened,— manufacturing fertilizers, landscape gardening, seed-testing, and cultivating flowers for perfumes and essences.

"The increase of a single bushel per acre in the yield of the wheat, corn, and oats of the country, would make an increase in the value of those crops alone, of over one hundred and sixty-four million dollars per year, which would be more than doubled by a similar increase in other crops. This can all be accomplished by good seed."

"The average yield of wheat in the United States is about twelve bushels per acre," with one and a half bushels of seed. Professor Blount, of the Colorado Agricultural College, planted seventy-six kernels of wheat, upon seventy-six square feet of land,

"and the product was ten and a half pounds, or nearly at the rate of one hundred bushels per acre." The conclusion is, that we bury too much seed by unscientific farming.

Mr. E. P. Roe made two acres of land yield a gross return of more than two thousand dollars. Members of the New Jersey Horticultural Society have made early cabbages produce $435 per acre, and early tomatoes $585 per acre.

Mr. J. S. Potter, consul at Crefeld, Germany, gives suggestive facts in regard to two farms, situated side by side, the one containing ten acres, and the other twenty. The owner of the ten-acre farm had been a teacher in an agricultural school in Germany, and worked his farm scientifically, and thus secured from it a comfortable living for himself and family. The owner of the other farm had a picked-up knowledge of farming, and "while working much harder, with double the investment in land, accomplished with less tidy and genteel accompaniments the same results."

A farm in France, that had been planted with olive trees, and yielded a rental of $115 a year, was planted with roses, geraniums, tuberoses, and jonquils, for the manufacture of perfumes. The fourth year it yielded perfumes valued at $43,154, giving a net profit of $7,767.

In the wheat contest of 1889, William Gibbey, of Utah, raised eighty bushels on a single acre. In the corn contest, Z. J. Drake took two hundred and fifty-five bushels of shelled corn from an acre In the potato contest, Alfred Rose raised one thousand and thirty-one bushels of potatoes on an acre. These results were due to the careful preparation and adequate fertilization of the soil, and good care of the growing crops. A neighbor of mine last year realized over $140 from his pear trees occupying hardly a quarter of an acre of ground.

The education of children in horticulture is no new thing. Sweden, France, Bavaria, and Austria have had school gardens many years. The normal schools of Austria give instruction in the care of the mulberry tree, bees, grape vines, and orchards. The Austrian public school law reads, "In every school a gymnastic ground, a garden for the teacher, according to the circumstances of the community, and a place for the purposes of agricultural experiment, are to be created." School inspectors are "To see to it that, in the country schools, school gardens

shall be provided, for corresponding agricultural instruction in all that relates to the soil, and that the teacher shall make himself skilful in such instruction." As regards teachers, the law reads, "Instruction in natural history is indispensable to suitably established school gardens. The teachers, then, must be in a condition to conduct them."

Twenty-five years ago there were, in Austria, 2,777 schools in which instruction in fruit culture was given. A recent issue of the "Boston Herald" contained this item:

"School gardens,— *i. e.*, gardens for practical instruction in rearing trees, vegetables, and fruits,— are being added to nearly all the public and private schools of Austria. There are now already 7,769 such in existence in the Austrian monarchy alone, Hungary not included. They also comprise botanical museums and appliances for bee-keeping."

In France, in 1867, there were 20,000 schools in which teachers and pupils found recreation and profit in garden and fruit culture. The teachers in such schools receive medals for excellence in farming.

The "Horticultural Times" for January, 1890, contains the following: "Throughout France, gardening is practically taught in the primary and elementary schools. There are 28,000 of these schools, each of which has a garden attached to it, and is under the care of a master capable of imparting a knowledge of the first principles of horticulture. The Minister of Public Instruction has resolved that the number of school gardens shall be largely increased, and that no one shall be appointed master of an elementary school, unless he can prove himself capable of giving practical instruction in the culture of mother earth."

It appears, then, that school gardens in France and Austria have long since passed the experimental stage, and are now successfully established as an essential means to the education of children. In France, in 1867, there were 20,000, in 1890, 28,000 and many more are to come. In Austria there were 2,700, and now there are 7,700,— nearly three times as many.

In some parts of Europe, grants of money are made to schools that reach a given standard of excellence in agriculture. About eighty per cent of the children of Sweden attend the Folk School, corresponding to our common schools, and in them there were in 1871, 22,000 children, who were instructed in horticulture

and tree planting. Each of 2,016 schools had, for cultivation, a piece of land varying from one to twelve acres.

In regard to appropriations for agriculture, our country compares very unfavorably with some European countries.

The Secretary of Agriculture of the United States, hopes to get an appropriation of $1,359,000 from our government, for the expenses of his department for the current year. Germany appropriates annually for agricultural purposes $2,850,000; Austria more than $4,000,000; and France $8,000,000. In proportion to her population, France appropriates more than forty times as much as the United States; and in proportion to her area, more than one hundred times as much. If Secretary Rusk gets the appropriation he desires, in no sense will it be commensurate with our position as the greatest agricultural nation on the earth.

The beneficent results of teaching European children agriculture may be seen even in our own country. In 1880 the Kentucky Bureau of Immigration induced colonies of Swiss, Germans, Austrians, and Swedes to settle poor lands in Laurel and Lincoln counties, Kentucky. Charles Dudley Warner writes that it is a sight worth a long journey, to see the beautiful farms made out of land that the average Kentuckian thought not worth cultivating. It should be noted that the settlers named came from the very countries where school gardens are so common and governmental appropriations so liberal.

During the year 1889, more than 200,000 immigrants, from Germany, Austria, Sweden, and Norway, came to the United States. Having learned to work farms scientifically, they are rapidly displacing our farmers.

A Swedish citizen of Springfield, Mass., has bought 22,000 acres of land in Vermont, which he will colonize by immigrants brought directly from Sweden. Thrifty foreigners are rapidly becoming the landholders, and our young countrymen are flocking to the cities to work on cars, in stores, or to live by their wits. The applications for positions on the cars of the West End Railway Company, number from seventy-five to one hundred a day. Most of these applicants have what is called "a good common school education," and many have a college education.

We have much to learn from the Swedish school system in particular. The Sloyd system of manual training is highly commended by educational experts. The Swedish system of physical culture has been recommended for introduction into the Boston

public schools, by the Board of Supervisors, and now, one thing more should be advocated by educationists and agriculturists combined, the Swedish school garden.

The Swedes realize that, for the purposes of observation, nature is better than pictures; and plants, growing under natural conditions, and visited by the birds and insects peculiar to them, are better than descriptions in books; and, if we would have our schools as excellent as theirs, and do something to brighten the prospect for agriculture, we should introduce the school garden into our system of education.

When we compare our system of education with the system commonly found in European countries, we cannot fail to see how much better balanced the European systems are than ours. So in the great jubilees of twenty years ago, we found every foreign band better balanced than any band we could produce. Every educational expert who examines the systems of education in Europe confesses that we are far behind European schools in science, art, music, and physical, industrial, and agricultural education.

The school garden should be not only a place for observation, but a field for experimentation. Budding, grafting, propagation by layers, cuttings, and slips, cross-fertilization, and the conditions favorable to plant growth could be taught experimentally, not to one class necessarily, but to every pupil somewhere in the course of study. Seeing and doing such things and recording the results, would give pupils a training peculiarly valuable. Here is a large field for the consideration of those who would send the whole boy to school. Here is an efficient means of interesting him. A lively personal interest is the mainspring of all proper mental development. Unless the boy is interested in the work of the school room, his mind will be on things outside of it; he will be present in body but absent in mind. How is it that the varied, instructive, and interesting work of the school garden has escaped the attention and appreciation of educators so long,—much more the appreciation and attention of agriculturists?

In the public schools of Boston, two hours a week are set apart for elementary science work, in all the primary classes and in the fifth and sixth grammar classes. Out-door work at all seasonable times should be substituted for the present in-door work. Work in the school garden would be as much better than work on the same material in the school room, as a visit to Paris is better than

a description of it. The school garden would furnish most of the material necessary for the winter's work,— seeds, buds, bulbs, tubers, corms, fleshy roots, pressed leaves and flowers, and other material.

Already much of such material has been used for a number of years by the pupils of the George Putnam School. Pupils of the fourth class make beautiful designs of pressed leaves, which they are accustomed to collect. Each pupil draws from five to twenty or more designs, according to his skill and interest, during the school year. The work goes on almost of itself, and the children are delighted to handle and adapt plant material to purposes of ornamentation.

Here are fifty-seven sheets of designs, representing fifty-seven pupils of the fourth class. These designs have been drawn recently from natural leaves. The pupils of the first class have made many pen-and-ink drawings of various kinds of grasses, such as timothy, red-top, Bermuda grass, knot-grass, wild oats, wild rye, wheat grass, panic grass, etc. Under the skilful direction of their teacher, who is a member of this Society, these pupils are learning to see as never before; are acquiring facility and power in representing objects that will add much to their usefulness and happiness in life, and at the same time are working toward horticulture,— not away from it.

Here are four hundred and eighty-one drawings of grasses, recently made from natural specimens, by the pupils of the first class. In addition they collect, press, and mount wild flowers, to serve as material in drawing and language work. Their written descriptions of many varieties of wild asters, and characteristic drawings of the mode of growth of each variety, serve the legitimate purposes of school work and continually suggest Nature. The derivation of specific names and other words from the same roots is made a valuable study. Such work connects Nature with the school; it directs the attention *towards* plant life rather than away from it.

The school garden is a place for children to be happy in. Many a child will remember it with affection, when he reaches the adult age, and we may naturally expect that when he acquires wealth he will remember it in a substantial way. At all events it is reasonable to suppose that many men and women will return to the pleasures of horticulture when they have earned a competence

in business, if they have received a part of their school education in a school garden. We know that the late Hon. Marshall P. Wilder returned to his early interest in horticulture, when he had become what has been called "forehanded."

In an essay entitled "Horticultural Reminiscences" published in the TRANSACTIONS of this Society, is an account of a school garden, established more than half a century ago, in connection with a boarding school in the city of Providence, R. I. At least four pupils of that school became eminent in agriculture, Joseph Brown and Obadiah Brown, of Rhode Island, and O. B. Hadwen and Hon. Daniel Needham, the latter two being distinguished members of this Society. In a letter to me, Mr. Needham wrote, "I have always believed that the training which I received in that school, did more for me than it would be easy to write. It gave me habits of punctuality and industry which in my life of today, are as apparent to me as they were forty or more years ago. I consider any boy poorly educated, who has not enjoyed the privileges of a technical or agricultural school." We can imagine what an influence for horticulture might be felt, if the common schools throughout the country should make good use of school gardens. Then children would get that general knowledge of horticulture that would lead to a demand for agricultural colleges, such as we have never known, and to the horticultural education of women.

Plants and flowers enter constantly and intimately into girls' and women's lives. Women have been interested in flowers since human beings came upon the earth. Some fill their windows with flowering plants the year round. Others cultivate them in their rough little gardens before the log cabins and shanties on the frontiers and in the wilderness. Some suggestion from plant life is always present in women's lives — embroidered flower decorations, flower painting, floral decorations, bouquets, and myriads of designs for needlework, wall papers, carpets, and prints,— and they should have some regular instruction in what they will always see and use; and the school garden would be the most efficient means of giving them instruction suited to the lives they are destined to lead.

Probably two-thirds of the public schools of Boston at the present time, have adopted the no-recess plan, and the number is increasing, not only in Boston, but throughout the country; in short, the recess is no longer considered necessary.

Some of the school yards in Boston have an area of three-quarters of an acre. What magnificent possibilities lie in those yards! With the abolition of the recess what is their reason for being as play grounds? How much more useful for instruction, for manners, and for morals, would they be as school gardens, than they have ever been as play grounds! Suppose the hard, monotonous-looking bricks to be taken up, except where they are needed for walks — wide ones for passages to and from the building, and narrow ones in the garden — what might we reasonably expect to see in the school garden? Certainly enough to make it seem like a paradise to look out upon in comparison with the ordinary Sahara-like school yard. As representatives of commercial and monocotyledonous plants, we could have wheat, rye, oats, barley, millet, corn, rice, timothy, red-top, etc., each having a square yard of ground to itself. Of dicotyledonous plants, a hill of scarlet runners, a ring of sweet peas, a square planted with acorns, or peach or cherry stones, etc.; plantlets in various stages of development; a row each of varieties of crowfoots, mints, lilies, pinks, roses, etc.; fleshy roots, as beets, turnips, and parsnips,— some, in their second year's growth, to show the nature of biennials. Many city children have never noticed such plants growing.

The flora of the vicinity could be obtained without much difficulty, even by city scholars, and with little trouble by country scholars. Almost any region within a radius of a few miles has plants that would serve as well for ornamentation as for observation work, among which may be mentioned a dozen varieties of asters, shrubby cinquefoil, blazing-star, wild lupine, Joe-Pye weed, Canada hawkweed, jewel-weed, cone-flower, hardhack, sweet pepperbush, golden-rod, wild columbine, cranesbill, harebell, Solomon's-seal, bellwort, wild bean, evening primrose, purple flowering-raspberry, Philadelphia lily, Canada lily, meadow rue, Jack-in-the-pulpit, clematis, and ferns. For every purpose of the school, such plants would serve better than cultivated flowers; and their variation under cultivation would interest and instruct every observer, and lead to a better appreciation of wild flowers, and a more rational and profitable way of spending summer vacations than obtains now.

Annual garden flowers and fleshy roots can be raised from seeds. The city forester, floriculturists, and horticulturists

generally, throw away thousands of plants every year, in changing crops and ornamental flower beds. To get rid of such plants advertising is often resorted to. How much better it would be to send them to school gardens, where they would be used to good advantage. The raising of plants for school gardens, by authority of a city or town, would give better returns than raising them simply for public gardens and squares; and the latter would be be better appreciated than they are now in proportion to the general increase of a knowledge of plants. Moreover, many pupils, favorably situated, would be pleased to contribute plants for the school garden, and in consequence would have a livelier interest in it.

How will the exercise required in the cultivation of plants in the fresh air and sunshine affect the health of children, especially those living in cities? The advocates of hygiene and school gymnastics, might do well to consider that question in all its bearings. Those who are so zealous concerning the ventilation of schoolrooms, might find it worth while to determine the benefits arising from ventilation in school gardens in favorable seasons. Why not convert gymnastic wands into garden hoes? Then the attention would not be concentrated simply upon the movements of those instruments, but upon the results of those movements. Boys do not whittle in marked time for exercise: they whittle to work out the embodiment of an absorbing idea. Walking for exercise is of little importance compared with walking for specimens of rare minerals, plants, or game. Hold a boy down to your commands, and, for the time being, he is a slave; give him an idea to work out by himself, and he becomes a free man. Not that the former is useless, but the latter is superior, and in it lies one of the cardinal virtues of the manual training school.

"The Maine Board of Agriculture is agitating the question, of introducing agricultural books into the public schools, as text-books." That would be beginning at the wrong end to aid agriculture. There are now too many books used in teaching, as compared with other means of instruction. "The American Garden," of 1887, says: "We are thankful indeed for what our instructors have taught us in text-books, even though we had to unlearn part of it; but, would it not be a wise move, to have a trifle more of the real thing to work on, in the field and garden? Let us labor with our sleeves rolled up, and under the blue

heavens seek and impart instruction. With the assistance, which dame Nature never refuses, what may we not expect from the coming generation of horticulturists?"

Modern educators have risen above the traditional theoretical and authoritative education, resulting from the study of books alone, and now demand a symmetrical education for children. That is an admirable purpose; but even the most advanced of those educators in this country have gone no farther than to provide for such an education as can be given under a roof, in a school building or in a shop for industrial training. I submit this question to the great body of agriculturists, out-door workers generally, and all other competent authorities: Can a symmetrical, or wholly healthful, education be given entirely under cover, and away from the light, the fresh air, the invigorating sunshine, and the smell of earth, and her exquisite productions?

The "Journal of Health" contains this remarkable statement: "Patients strolling on the sea-shore, in sunny weather, are in a light, not two or three times, but eighteen thousand times, stronger than that in the ordinary shaded and curtained rooms of a city house; and the same patients walking along the sunny side of a street are receiving more than five thousand times as much of the health-giving influence of light, as they would receive in-doors, in the usually heavily-curtained rooms." As regards health-giving light and air, the school garden is a thousand times better than the school room.

What can horticultural societies do to enable children to receive instruction in horticulture? They have not the point of vantage, to give direct instruction as the common schools have, but they can influence instruction, if they choose. Among the members are persons excellently fitted by education and experience in agriculture, to set forth clearly the commercial value of a knowledge of it, and the training of the powers of observation and other mental faculties, in the process of acquiring that knowledge. They ought to be represented in school committees everywhere, as well as the lawyers, the doctors, and the ministers, who always influence education in the direction of the learned professions,— never in the interests of agriculture.

Consider what studies have been introduced into the common school curriculum within a comparatively few years,— sewing, cooking, manual training for boys, kindergartens, and various

modifications and better adaptations of every branch of study. Kindness to animals has been advocated in all the schools of the commonwealth; the temperance people have had a compulsory school law passed; in Boston an instructor in hygiene has been employed for some years; the entering wedge of the Sloyd system of manual training has been admitted; a mighty conference of the leading spirits in physical training has been held in Huntington Hall, and the representatives of various religious denominations have waged a war of words concerning the teaching of history and religion in the schools. Among all these things advocated there has been no suggestion of agriculture, but during their advocacy much has been said about sending the *whole boy* to school, when apparently what the whole boy is has not been determined. His earthly part, or rather his relation to the earth, has been entirely left out.

Even among educators and school committees, the prevailing idea of a proper education is shaped from consideration of trade. In the Report of the School Committee of Boston, for 1889, we read: "Those who are compelled to end their school life with the High Schools, are furnished with a sound, practical education, which enables them to enter mercantile and commercial occupations." This new method fails to recognize the great relative importance of our agricultural interests.

The Secretary of Agriculture in his report for 1889, says: "It may be broadly stated that upon the productiveness of our agriculture, and the prosperity of our farmers, the entire wealth and prosperity of the whole nation depend." Nevertheless, this great industry, that enters so largely and intimately into the life of the nation, has been an unknown quantity in our schools, as if the mainspring of all our national prosperity, would in some way take care of itself, in spite of the untoward influences of our schools. Is every line of work, except that connected with the earth, to be considered as holding the indispensable principles of education, while the study of the natural products of the earth, the source of all practical ideas and all material wealth, is to be considered of no special importance, in training a child for life?

A large majority of our public schools have done little or nothing in the study of plants, insects, minerals, and soils, although expected to do so, alleging that such study is not practical; but the conning of books, and the figuring on slates, they claim to be

practical. What is the opinion of agriculturists on that matter? Are not potatoes and wheat practical things? Is there anything theoretical about the potato bug and the currant worm? Anything psychological about loam and phosphate? Anything allegorical about the codling moth and the peach tree borer?

The remedy for this state of affairs lies in placing the right kind of men upon school committees, who influence legislation and education, and agriculturists should be represented on school boards as well as the lawyer, the doctor, the clergyman, and the tradesman.

This Society should secure as members teachers who are known to have an interest in subjects closely related to horticulture. If a teacher can graft trees, or raise fruit or vegetables successfully, or makes a speciality of bulbs, orchids, ferns, or wild flowers, or is a good botanist, he may be especially valuable to the Society, which, with its learned members and exceptionally fine library, may be as valuable to him. He would be likely to appreciate the value of school gardens in the education of children; he could choose and adapt material wisely; and, above all, he would have the point of vantage to influence members of the school committee towards the legislation desired for the establishment of school gardens.

Closely connected with the subject of school gardens, is a line of work that has been carried on very successfully for many years, by a few members of this Society, but has not received that full recognition as a valuable means of instruction to which it is entitled. I refer to the work done by Mrs. Richards, Mr. Hitchings, and others, in bringing collections of native plants to the exhibitions of this Society. If we are to estimate this work at its real value, in promoting the highest interests of education, we must come to the conclusion that these people who do it, do not receive a reward commensurate with the usefulness of their labors.

The collections of native plants are especially interesting and instructive to teachers. They influenced me more than anything else here to become a member of this Society, and they ought to be studied by a hundred teachers, where they are now studied by one. Let us establish school gardens, and they will be so studied.

Mr. W. W. Rawson in his seed catalogue says: "The Massachusetts Horticultural Society of Boston — the most flourishing

institution of its kind in this country — by offering liberal prizes, has done so much to stimulate growers, and improve the quality of the most popular vegetables and flowers, that varieties may be considered absolutely perfect."

Why limit the offer of prizes to the present field? In Europe, agricultural societies give prizes for the best school gardens. In the present condition of horticulture and agriculture, such prizes offered in this country would be more productive of good than prizes for the best displays of flowers, fruits, and vegetables from the home garden. As such prizes would concern a school as a whole and not individual pupils, no ungenerous rivalry need arise.

The American Agriculturist has recently awarded four prizes for a wheat contest, the first prize being $500 in gold. It has awarded $500 in gold as a first prize in a recent potato contest. It offers $5,000 in prizes for the new potato contest for 1890. Mr. Z. J. Drake, of South Carolina, has received $500 from the American Agriculturist, and $500 from the Department of Agriculture in South Carolina, as first prizes in a corn contest. The trustees of the Missouri Botanical Garden at St. Louis have established six scholarships, ranging from $200 to $300 a year, with free lodgings, and continuing six years. All such enterprises are worthy, but the enterprise that aims at raising the whole status of agriculture, and at the same time rounding out the education of all the children in the land, is more worthy.

This Society has the well-earned reputation of being very liberal in offering prizes, but not unfrequently members question whether the sum of six thousand dollars, which is paid out in prizes every year by the Society, is expended to the best advantage. If the Society feels disposed to try a very promising field, now is the time, and Boston is the place for the trial, and this Society has everything in its favor for making the trial. Here is an opportunity to set an example for every city and town in the Union to follow, and that association or city that begins the movement will become famous for a magnificent enterprise.

Some one may ask: "If there is so great an advantage in the establishment and use of school gardens, why has the matter not been attended to by the school authorities?" It is well known that the best educational impulses come from without,— from philanthropic individuals or institutions. We need not go outside

of Boston for proof of this. The sewing schools, cooking schools, kindergartens, and manual training schools, now corporate parts of our school system, were started and carried beyond the experimental stage by private individuals. Mrs. Shaw and Mrs. Hemenway looked farther into the future than the Boston School Committee. These philanthropic women are now paying for the instruction of public school teachers in physical training and industrial training. For years the Teachers' School of Science in Boston has been supported by private munificence. "The Chicago Manual Training School, owes its existence to the Commercial Club, a social organization consisting of sixty Chicago business men," who in 1882 guaranteed the sum of $100,000 for the support of the enterprise. It should be noticed that these movements, and many other similar ones that might be named, have had in view what must enter into the life of the nation. We should also call attention to the fact that educational authorities in this country seldom or never start such beneficent enterprises, but in Europe the case is the reverse.

An appropriation of $30,000 has been asked of the city government of Boston for the purpose of establishing one manual training school, and running it one year. Why, half of that sum would suffice to establish a good school garden in connection with every one of the fifty-five grammar schools in Boston, and keep it running a year, allowing $275 to each school. The benefits of these gardens would not be confined to a comparatively few pupils, but full forty thousand pupils would have a share in them. The erection of costly buildings, and the collection of costly plants, have no bearing upon the question. We already have the grounds necessary; we have the time specified for such work, in the "Course of Study," from two to three hours a week, for each of the five lowest grades; and every plant necessary will cost nothing, or next to nothing, comparatively speaking.

Permission of the School Committee should be obtained to convert the most available part of some school yard into a garden, for observation and experimentation, to begin with. Then the money to pay the expenses of getting it ready in spring, and keeping it in order during the long vacation in summer, should be guaranteed. With half of two hundred and seventy-five dollars, I am sure I could establish a good school garden in connection with my school, and keep it in good order during the first season,

with the certain prospect of largely reducing the current expenses for the second season. If it can be shown in connection with one school, that the school garden is entirely practicable and comparatively inexpensive, it will not be long before other schools, in the suburbs at least if not in the city, will wish to establish school gardens. If their success has been complete in thousands of cases in Europe, they will succeed here.

I trust you will think with me, that the length of this paper is by no means commensurate with the importance of the subject of it,—Horticultural Education for Children.

The exhibition of work done by the pupils of the George Putnam School, included many drawings from life of a great variety of plants, and ornamental designs in which the leaves and flowers of gathered specimens were used as models for the parts. The whole showed much skill and taste, and evidence of a strong interest in the work on the part of the young artists.

The essay was applauded at the close, and a vote of thanks to Mr. Clapp for his valuable paper, which would benefit not only the present generation but the generations to come, was unanimously passed.

Discussion.

E. H. Hitchings said that the essay just read recalled a paragraph in Higginson's "Out-Door Papers," a book which every lover of Nature should read. On page 243 he says: "It is no wonder that there is so little enjoyment of Nature in the community when we feed our children on grammars and dictionaries only, and take no pains to train them to see that which is before their eyes. The mass of the community have 'summered and wintered' the universe pretty regularly, one would think, for a good many years; and yet nine out of ten in the town or city, and two out of three even in the country, seriously suppose, for instance, that the buds upon trees are formed in the spring; they have had them within sight all winter, and never seen them. So people suppose, in good faith, that a plant grows at the base of the stem, instead of at the top; that is, if they see a young sapling in which there is a crotch at five feet from the ground, they expect to see it ten feet from the ground by and by,—confounding the growth of a tree with that of a man or animal." Mr. Hitchings cited as an

illustration, the erroneous statement in an article in the "Century" magazine for March, 1883, by John Burroughs, who wrote: "The limbs of the White Pine tend to recur at regular intervals, like the rounds of a ladder. As it shoots upward in the forest it pulls this ladder up after it, so that the tallest trees are limbless for eighty or ninety feet." Again, the last quoted writer says in "Scribner's" magazine for February, 1881: "It is a curious and noteworthy fact, that, for the glow-worm of the Old World, Nature should have given us the fire-fly of the New. It strikes one as a typical fact. Our fire-fly is the glow-worm Americanized." The truth is that we have both fire-flies and glow-worms here; the speaker had collected them within ten miles of Boston. The publication of such mis-statements shows how defective is the education which permits their being made, and the necessity of such a reformation in school training as the essayist had so well presented.

Edmund Hersey said he had been much gratified and instructed by the lecture today. Children ought to be educated to read the great book of Nature. Too many of our people are in this respect uneducated. Parents are to blame if they do not make their children realize something about Nature. He would not have them instructed solely for the purpose of making them gardeners, but that they might be fitted by their education to enjoy life better, whatever vocation they followed. He would educate children to recognize the Power which laid out the plan of growth in all things, and executed that plan.

Leverett M. Chase wished to express one thought. A German proverb teaches that "whatever we would introduce into our national life we must first introduce into our schools." Our country has unequalled resources; we have every variety of soil, temperature and humidity. Let our people but learn to utilize our resources and America will be the most productive and beautiful country in the world. But the most important result will be the tendency to check urban growth,—one of the most striking and alarming features of our civilization, whose crop is the destruction of what is best in men,—and to increase the production of the best and most profitable crop that can be raised and that is, strong, virtuous, intelligent men and women.

Rev. A. B. Muzzey said there had been no paper presented here which goes down deeper than the one of today. Our public

schools are of transcendent importance. But there is a great power behind them; the home, the parents. He would have fathers and mothers brought to think on this subject. The first thing for us to consider is the proper development of the powers of mind which in the children are latent. We should begin with the home as the source of the greatest influence. Mothers come here to see the flowers and plants that are brought in for exhibition. They receive the divine influence which flows from the beauty and fragrance of these choice productions, and that influence is more or less reflected in their homes. He remembered the feelings with which he contemplated the first flowers he saw at his early home. It is an irreparable loss to a child not to have a true home-life to look back upon in after years. He wished our people of New England to consider this matter, and to devise the best possible methods of teaching their children, by which they shall become attached to the soil. Where practicable, every child should have a spot of ground to till with his own hands. He was desirous that this Society should use its influence to propagate the idea he had tried to express. If by any means parents could be brought to co-operate with teachers in the education of their children in this work, it would year by year be steadily and surely accomplished.

Rev. Calvin Terry spoke of the gratification the essay had afforded him; of the great importance of the subject; of the principles which lie at the foundation of all good education, which develops the tendencies to make good citizens of the children trained in our schools. He spoke of the contrast between the school facilities or machinery of education of half a century or more ago, and those of today; quoting Beecher's description of the district school house of the early days, which was built wherever it could be placed without much expense, and, on the same principle, finished and furnished in the plainest manner. It was destitute of any hint of ornament and of all illustrative apparatus. Now, we must have the most costly edifices and all needful appliances to make school life a journey of delight. He did not object to the present appliances. Perhaps we have gone to the other extreme. Children go into the primary hopper and are ground out as grammar or high-school graduates. Our schools are now run on the high-pressnre system, which is promoted by the rivalry between the schools of each town, and also between those of one town and

those of other towns around. Some children can learn four times as fast as others, but by the present system they all have to be laid on the same iron bedsteads. Mr. Terry rather liked the idea of school gardens, but felt some fear that if that plan were introduced the children would not be allowed generally to take responsibility in the cultivation therein—that the janitor would cultivate and the children look on. To make the school garden a success the children must have a place where they can put into practice what they are taught about cultivation, and thus get practical knowledge as the essayist had indicated. The speaker remembered that he had a taste for plant culture, when a boy; that an idea of utility was connected with his cultivation of his crop and that the latter was a fine bed of saffron. He remembered also, that when he marketed the flowers the apothecary cheated him. But there is beauty and utility in cultivating the plants that grow naturally around us. There is beauty in a field of potatoes—in a bed of sage—beauty and music in a field of growing corn. Multitudes went to see that prize field of corn in South Carolina. That was a grand illustration of beauty and utility combined, and it is clear that we must have this combination taught even in the school garden instruction.

> "A thing of beauty is a joy forever;
> Its loveliness increases; it will never
> Pass into nothingness; but still will keep
> A bower quiet for us, and a sleep
> Full of sweet dreams, and health, and quiet breathing."

The culture of beauty in the vegetable kingdom secures a crop of joy to the thoughtful culturist, and not that alone—it is a great promoter of health. There is with it no dyspepsia, no insomnia when one has been thus busied in the open air. Think of the wholesome effect on discontented mechanics if they could go home and work an hour in the garden, instead of passing their leisure hours in fretting and grumbling.

Dr. C. C. Rounds, Principal of the State Normal School at Plymouth, N. H., being present, was called upon, and responded by giving a synoptical account of the present school system of France. Under commission from the Governor of New Hampshire, he attended the International Exposition at Paris, France, and while there, in connection with his official duties he made a study of the French system of education. At the Exposition,

France made far the best showing in this department. Paris was far ahead of any other part of France. No city or town probably ever made any such exhibit before. The present order of things has been developed during the last ten years, and what France has done in that period is simply marvellous. They have *done* the things we have only *talked about*. Education is compulsory for all children from seven to fourteen years of age, and parents are held to strict account, even to imprisonment, if their children are not regular in attendance. The course of study during that period gives a better preparation for the duties of life than is given by the course extending through many of our high schools. We have long discussed the possible connection between the kindergarten and our public schools. In France the essentials of the kindergarten have been made a part of the lowest grade of schools, and the name, kindergarten, has disappeared. It should be remembered that the mass of those who are in the schools are to become workers, yet the problem of manual training in the public schools has not secured much favor in this country. But in France, it is, by decree, made a branch of school work, and two or three hours each week, according to the grade of schools, must be given to manual education, beginning in the *primary* schools. In this connection the principles of agriculture and horticulture are also taught. France agrees with us that teachers should be trained; accordingly she now has in each of her eighty-six departments two normal schools, one for men and one for women, and to ensure competent teachers for these she establishes two higher normal schools to prepare them. The public schools are entirely free—tuition, text-books, everything. A law was passed favoring the establishment of girl's colleges, and several have been established. To meet a new demand, France established a school to train professors for these girls' colleges. The administration of the French system is vested in a Minister of Public Instruction, a national council—called the Superior Council—of forty-seven members, district inspectors-general, etc. The council determines what shall be taught, and the normal schools train the teachers to teach it. France is a representative republic, and her continued existence depends upon the intelligence of the people. She must therefore see to it that every child is educated, and she aims to educate the *whole boy* and the *whole girl*. Parents or guardians may send children to the public schools, private schools, or church

schools, but what the national council prescribes as necessary studies to make the pupils good French citizens, *must* be taught, and thoroughly taught, and whatever that council proscribes as contrary to the constitution, or laws, or morality, must not be taught. Dr. Rounds was surprised at the lead taken by the French schools in the inculcation of morals, duties in the family, to the country, and to God. The school authorities foster professional schools for young women, even urging them to take the education which will make them cultivated women. It is the purpose of the government to make France a democratic republic. She honors those who have honorably served the Republic, whatever the condition of the person, or the department of service. The advance already made by France under the present system, gives assurance that whatever else is in store for that country the Republic will be saved through education.

The announcement for the next Saturday was a paper on "Dahlias," by William E. Endicott, of Canton.

BUSINESS MEETING.

Saturday, March 22, 1890.

An adjourned meeting of the Society was holden at half-past eleven o'clock, President William H. Spooner, in the Chair.

The Secretary laid before the Society letters from Hon. Henry Cabot Lodge, Hon. John F. Andrew, Hon. Rodney Wallace, and Hon. Elijah A. Morse, acknowledging the receipt of the Resolutions and Memorial of the American Forestry Association, in regard to the preservation of forests on the national domain, with the approval of this Society, and stating that the Memorial and Resolutions would at the proper time receive attention.

Adjourned to Saturday, March 29, 1890, at half-past eleven o'clock, A. M.

MEETING FOR DISCUSSION.

The Dahlia.

By William E. Endicott, of Canton.

In the Gardeners' Chronicle of 1879, Mr. Hemsley reckoned the number of species of dahlia as nine: *imperialis*, *excelsa*, *Barkeriæ*, *Maximiliana*, *scapigera*, *variabilis*, *coccinea*, *gracilis*, and *Merckii*. These are reduced to four or five in the "Genera Plantarum" of Bentham and Hooker. All the species and natural varieties, however many they may be, are natives of Mexico, and are found at various elevations from four thousand to ten thousand feet. The genus is named from the Swedish botanist, Dahl; the first *a* therefore should be sounded as in *father*, though we generally hear the word pronounced *dăll-ya*, and in England, if we may judge from Mr. Hibberd's remarks, *dāle-ya* meets acceptance. The genus was also at one time called Georgina and is entered under that name in German catalogues.

Seeds of the Dahlia were sent to Madrid by the botanist Cavanilles, in 1789, and some of these were sent to Kew by the wife of Lord Bute who was then British ambassador to Spain.

One complete century of cultivation has been expended upon the Dahlia; in a few weeks we shall begin its second century of development. Strangely enough at the end of the century, the original single forms enjoy the highest degree of popularity. In one hundred years the entire circle has been traced and we find ourselves back at the point of beginning.

The dahlia was known only as a single flower for twenty-five years; it was not until 1814 that the first double was raised; but the break once made double flowers became numerous. Among the earlier double flowers were many with flat or pointed petals, very like most of the so-called "cactus" varieties of the present day.

The culture of the dahlia is not a difficult matter. In May the roots should be brought out from their winter quarters and examined. The tubers which are hanging to the crown by only a few dead fibres should be cut off and the sound part so divided that each portion shall have not more than one or two buds; these will be readily discernible in May. If the roots are planted

year after year without division, not only will they form unwieldy masses but there will be a multitude of feeble shoots whose flowers will be few and poor.

The soil should be such as is neither light nor heavy and a plentiful supply of manure should be used. Chemical fertilizers will induce a low growth, not high enough to hide a child, while barnyard manure will cause a tall growth. For my own part I prefer tall plants and should use manure if I could get enough of it, for though dahlias raised on it need staking to keep the wind from breaking them, the flowers are much finer both in shape and color and the foliage has a freshness and perfection which adds much to the beauty of the plant. With chemical fertilizers there are too many ill-shaped and ill-colored flowers and the foliage is more apt to be infected with a fungous growth which causes it to turn yellowish at the edges and to shrivel toward the end of the season. The roots should be planted about the end of May and should be covered about three inches deep and there should be at least four feet of clear space allowed on each side; otherwise full development cannot be expected. I have seen them planted singly on lawns, and so treated a tall, bushy and well-flowered plant of a large blossomed variety makes a fine appearance. As in the majority of plants, the after cultivation consists simply in keeping the ground loose and clean and in supplying water occasionally if the season be dry, for the dahlia needs a good supply of water. I remember a season in which from many hundred plants I had but one flower, while a field of gladioli blossomed as well as ever. The first frost will destroy the plants but it is by no means necessary that they be then taken up. On the contrary they will keep better in the ground than out of it until the end of October; all that is necessary is to lift them before the ground freezes up. I have known a root accidentally left in the ground over winter to come up in the spring and flourish as vigorously as if it had been stored in the cellar through the winter.

In taking up dahlia roots, it is necessary to observe two precautions: not to shake them too violently in removing the earth, otherwise the necks of many tubers will be so injured as to rot away during the winter; and to invert the root for a while after cutting off the stems so that the moisture which drains off shall not run down upon the crown, thereby causing the buds for next year's growth to rot. Neglect of these precautions has been the destruction of many a good collection.

The dahlia is propagated by cuttings or divisions. The latter method may be carried out at any time from lifting to planting; it consists simply in cutting the old root into pieces, leaving one or more "eyes" on each.

If it is intended to propagate by cuttings, the roots from which the slips are to be taken should be potted and put into a warm greenhouse in the first part of February. When the shoots are about two inches long they should be cut off just below a pair of leaves, the buds in the axils of which will form the eyes of the tubers which the cutting is to develop. If the cuttings be taken with a long piece of stem below the leaves they will root and form tubers, but these will never grow after the first year for they will have no buds at their crowns.

The cuttings are rooted in sand in the ordinary way, and may be planted out when the weather becomes warm enough. It sometimes happens that a cutting has a hollow stem; without special treatment this will never root, but if it be split up to the leaves, and one of the halves cut away the cutting will root without much trouble.

New varieties must be raised from seed, for the dahlia rarely sports, though it sometimes does so. I have never seen more than one instance; in that one several tubers of Emma Cheney, a very large rosy colored sort produced mahogany brown flowers and have continued to do so. It is said that the plump seed is of little value but that the thin ones are more apt to produce fine flowers. I have not found that there is any such difference. Whatever seed you use you will not get more than one flower worth saving out of a thousand seedlings. Seed is readily obtained; if you pull off one of the dead dry heads left where a blossom withered, you will find the thin black seeds among the chaffy bracts; these should be planted out of doors where the plants are to remain, as soon as the ground is warm enough. If these plants are taken care of and given room enough they will probably blossom in September.

We are commonly advised to sow the seed under glass in March, but those who do so will be sorry before the end of May, for the seed starts so readily and the young plants grow so freely that the hasty gardener soon has to choose whether he will throw away some of his dahlias or some of his other plants.

In the dahlia as we now have it the tendency to variation is pretty thoroughly fixed. Out of two hundred seedlings raised

from seed of the fine white pompon variety, White Aster, I had flowers of every sort and kind and every shade of color,—single, pompon, and large doubles, some of the latter pretty good and some poor enough to be offered as first rate "cactus" dahlias.

We seem to be advancing from the single flowers over precisely the same ground formerly traversed, for most of the "cactus" varieties of the present day are in no respect different from varieties figured fifty years ago in the "Floricultural Cabinet" and other publications. I looked at a plant over a stranger's garden fence last summer, trying to decide whether it was the much lauded Henry Patrick or a poorly grown specimen of some worn-out variety; I could not settle the point.

Into what will these loose flat petalled varieties develop? Will they become the round, perfect, show dahlias as they did before, or will they take a different turn and produce some new form? It seems to me that the same materials — the species *variabilis*, *coccinea* and *gracilis* — must produce the same results. Within a year or two *Merckii* (*glabrata* of some) has been crossed with some of the old sorts and the offspring have been bushy little plants not more than eighteen inches high, and with large single flowers which, however, are just like what we have now.

In so large a family as the Compositæ, to which the dahlia belongs, it seems probable that some genus exists with which hybrids may be formed, and it is from such a source that new kinds are to be had if at all. A correspondent has lately sent to the "Gardener's Chronicle" what he states to be the offspring of a dahlia and a perennial sunflower. The learned editor declares that he sees nothing of the sunflower about it, but admits that he cannot say that such a cross is impossible,—an admission that botany has learned something from horticulture, for thirty years ago the idea of a bi-generic hybrid would have met nothing but derision.

There is still one point in which the present race of dahlias may be improved,—I mean *hardiness*. We frequently have a frost in the first part of September which kills all our dahlias; then succeed several weeks of bright mild weather in which our blackened plants present but a sorry figure. If we could infuse enough hardiness into them to enable them to withstand this first frost, it would be a great point gained. Two years ago among some hundreds of seedlings which the frost had destroyed, one

stood up as fresh and green as ever. I ought to have marked it for preservation, but I put off doing so and the result was that it was lost. This incident shows that a moderate degree of hardiness may be attained by the single process of selection among seedlings: perhaps by hybridization perfect hardiness may be reached.

We frequently hear and read discussions as to whether single or double varieties are to be preferred; but these two classes are so very unlike each other that a comparison between them is hardly possible. Both are desirable,—both are beautiful; each in its own way. The large double dahlia is certainly heavy in appearance, but it has a richness of color, a delicacy of shading, and a perfection of construction that the singles cannot approach. I marvel that any one can examine such a flower as Flamingo or Sarah McMillan without admiration. The single dahlias are so free in flowering, so cheerful and graceful as they stand in the garden beds, that I wonder that any one should declare he will have none of them.

It is commonly expected that a paper of this kind shall finish with a list of best varieties, and warned by a previous experience I shall try to meet this expectation. But first I will describe such of the wild species as seem to need a word. *Imperialis* is a very beautiful species, which, however, will never be much grown, because it does not flower until November and then only on stalks twelve or fifteen feet tall. Nothing can much exceed the beauty of its clusters, however, consisting as they do of flowers gracefully drooping, white faintly flushed with pink, and with petals so disposed that the flowers look more like lilies than dahlias. This species is well worth growing for the beauty of its foliage, which is much divided and arches out from the stem like some kinds of aralia. *Excelsa* is another tree-like plant, coarser in foliage than *imperialis* and also late flowering; the blossoms are pink. *Merckii*, called also *glabrata*, is a very dwarf species, not over a foot and a half high. In no respect does it resemble the other species in appearance. The foliage is shiny and very finely cut, and the blossoms much resemble the coreopsis in size, shape, and length of stalk. The colors are white, pink, and purple with a dark brown centre. The other species are much like the ordinary crimson and scarlet single varieties.

As for varieties I cannot pretend to name the best, for the first rank contains a very great number of kinds; but I will name a few which I think are as good as any. These best flowers are by no means all of modern date, for Miss Caroline, a beautiful show flower, was raised in 1853, and Paragon, one of the best of single sorts, was in existence in 1834.

The large flowered double sorts are classed as "Show" and "Fancy" kinds. The distinction is not much regarded in this country. The possessor of the following kinds has a good collection:

Anne Boleyn, light flesh.
British Triumph, dark crimson.
Duchess of Cambridge, rose with crimson tipped florets.
Earl of Shaftesbury, rich purple.
Flamingo, vermilion.
Julia Davis, rich yellow.
Lady Allington, scarlet, tipped white.
Lord Hawke, yellow and buff.
Louisa Neate, pink.
Miss Ruth, lemon yellow with white tips.
Mrs. Gladstone, delicate soft pink.
Prospero, plum color, tipped white.

Some very good Pompon or small flowered double kinds are:

Catherine, yellow.
Cochineal Rose, deep crimson and of perfect form.
Figaro, buff with crimson edge.
George French, crimson if seen from the front, bluish rose if looked at from the side.
Isabel, brilliant scarlet and of finest form.
Liebchenmein, white, bordered violet.
Little Goldlight, golden yellow, tipped scarlet.
Lurline, yellow.
Mercator, pink, tipped crimson.
Pure Love, lilac.
Snowflake, creamy white.
Sparkler, scarlet.
White Aster, pure white with fringed petals.

Of the "Cactus" varieties there are by far too many, unless their quality improves. Juarezi, named from Juarez, the former

President of Mexico, was the first, and is so far the best, that I am almost inclined to say that no other sort is worth growing. Its color is intense and pure scarlet, and its shape and the arrangement of petals are peculiar. I regard it as a very valuable introduction. Lord Lyndhurst is very good, and is a reproduction of it on a somewhat smaller scale and in a lighter shade of color. It is, I think, a sport from Juarezi. Mondamin is a fine pink variety raised from seed of Juarezi and has the same peculiar shape. I can name no more than these three. I have not seen all that are in existence, but I have seen many and do not desire to own them. It is of no use to mention single varieties.

At the close of the lecture, a vote of thanks to Mr. Endicott, for his very able and interesting paper, was unanimously passed.

Discussion.

John C. Hovey spoke in commendation of the class of Bouquet dahlias. They grow only from a foot and a half to two feet high and do not require staking. They flower very abundantly. He thought the varieties raised here from seed would flower earlier than foreign varieties.

Leverett M. Chase said that he visited Mr. Endicott's grounds two years ago and saw a variety which was one mass of flowers and very beautiful. It was Highland Mary, and was raised by Mr. Endicott some years ago from seed of White Aster. The most noticeable thing there was a line of this kind; he had never seen anything so floriferous; the flowers grew above the foliage and in unceasing abundance. They are of a delicate pink with patches of white florets.

John Parker said that he had had an experience of sixty years in growing dahlias and had always been successful. He had been an exhibitor more than forty years. At the Annual Exhibition of this Society in Faneuil Hall in 1848, he exhibited forty-seven varieties of dahlias. He had set out a plant in flower in April which had continued to flower until frost. He had had a plant of Lord Liverpool which grew to be fourteen feet high. The dahlia is in its glory when all other flowers are faded and gone. He gives them plenty of water and plenty of enrichment and trims them up to a single stalk. The French have a method of letting them lie on the ground and flower like bedding plants.

He pins a piece of tissue paper over flowers to preserve them for exhibition. He uses every kind of fertilizer. The dahlia attempts too much, and is improved by taking off part of the buds.

Mr. Hovey would encourage the cultivation of dwarf Bouquet dahlias rather than laying down tall growing varieties. By improving the dwarfs much better results may be secured. Last fall he saw a plant of the White Bouquet variety bearing twenty flowers.

John S. Martin said he had greatly enjoyed the interesting and valuable lecture upon the Dahlia, its properties and needs. But he would recommend, especially to amateurs, the growing of dwarf varieties. While this class possesses great beauty of form and richness of colors in the flowers they are very free bloomers. The compact growth of the plants permits the cultivator to have a large number of varieties upon a small area. Another advantage from their low stature is the ease with which they can be fully protected from early frosts, thus securing the continued enjoyment of their varied beauty long after the tall growing varieties have been destroyed.

The Chairman of the Committee on Publication and Discussion, stated that Hon. Henry L. Parker of Worcester would be unable to present the paper announced on the programme for next Saturday, and that the meeting, which would be the last of the season, would be open for the discussion of such subjects as might be suggested.

BUSINESS MEETING.

SATURDAY, March 29, 1890.

An adjourned meeting of the Society was holden at half-past eleven o'clock, the President, William H. Spooner, in the Chair.

The Secretary read a letter from Hon. John W. Candler, acknowledging the receipt of the Resolutions and Memorial of the American Forestry Association approved by this Society, and stating that he is interested in the subject to which they refer and would give them careful consideration.

The Secretary also presented a letter from the Worcester Agricultural Society, returning thanks for the invitation to appoint a member who should have the free use of the Library and Library room for the purpose of preparing essays to be read before Farmers' Institutes, and stating that Calvin L. Hartshorn of Worcester had been appointed to enjoy that privilege.

Mrs. H. L. T. Wolcott referred to the subject of Horticultural Education for children, which formed the subject at the Meeting for Discussion two weeks previously, expressing the desire that something should be done by the Society to promote that object, and moved that the subject be referred to the Committee on Window Gardening. A discussion of the subject followed.

Edmund Hersey said that the future of the country depends upon the proper education of the children, and if this Society can do anything to get the children interested in the cultivation of fruits or flowers or vegetables, it should do so. We are soon to leave our places here, and if the Society is to prosper we must take action to interest children in horticulture, so that they may take our places when we are gone, and do better than we have done. There are many difficulties in the way when we attempt to make our ideas practical, but still we can do something. In Hingham, where the speaker resides, the Agricultural and Horticultural Society has a Children's Department, which strengthens the society and improves the children. Working on these lines, offering premiums for the best fruits, flowers, and vegetables grown by children, will be a step in the right direction. Another step suggested is that since this Society is affiliated with the State Board of Agriculture, and whatever the Board requires societies to do they must do, there being seven members of the Board who are also members of this Society, can they not influence the Board to do something in this direction? The Board might require the societies to offer prizes for the best herbariums of ferns and grasses collected by children and thus educate them to observe better than ever before. Another point is that we now have a series of lectures every winter which are listened to mostly by gray-headed persons; might we not have one lecture especially adapted to the older children in the High School? In Hingham, notice is sent to the teachers of whatever is done by the Agricultural Society which will be for the benefit of children, and the

result has been for the advantage of both the society and the children. The same course was pursued at a recent farmers' institute at Topsfield with promising results. The Society should look into this matter carefully, and wherever it sees an opportunity to elevate the education of children it should improve it. It has already done much in shaping opinion in regard to the cultivation of flowers, especially in New England,— perhaps more than we realize. That flowers are cultivated as much as they are from northern Maine to the southern boundary of Connecticut is largely due to the influence of this Society. Whatever we can do to improve the cultivation of fruits, flowers, and vegetables, especially among children, let us try to do it.

Francis H. Appleton said that as a member of the State Board of Agriculture he should be glad to promote any movement which the Board might make in the direction indicated by the last speaker. This State has been a pioneer in education, but perhaps some other States are now in advance of us in the special department under consideration.

John S. Martin, by request, related some experience in regard to the subject before the meeting. When a young boy he was transferred from the public schools in this city to one in Maine where the schoolhouse was very different from those in Boston. Near it was a piece of woods belonging to the school grounds, and in this a patch was cleared and planted by the boys and girls with flowers which they collected in the woods and elsewhere. This place the children made their playground and ate their dinners there, and there were no quarrels among them, but great comfort and enjoyment. No bad language was heard, and the speaker did not believe there was a happier group of children in the State. He felt much interested to have school gardens in Boston if possible, for there is nothing more desirable as an educational influence.

Henry L. Clapp, principal of the George Putnam School in Roxbury, and author of the paper which had led to this discussion, said that while he thought highly of school gardens, such as had been described by the preceding speaker, his purpose was to have plant culture for educational purposes. He had known school gardens to be robbed, and he would not cultivate in them such flowers as would attract robbery, but ferns and grasses and similar plants. His idea was that time now given to the study of plants

in the schoolhouse should be spent in the study of plants in the school garden.

The motion that the subject be referred to the Committee on Window Gardening was unanimously carried.

The meeting was then dissolved.

MEETING FOR DISCUSSION.

The Tour of the Grangers in California.

By O. B. Hadwen, of Worcester.

In speaking of my sojourn in the great State of California and giving an account of its agricultural and horticultural resources and interests, built up since the tide of emigration from the Eastern States set towards the western slope of the Sierra Nevadas, I can but declare that neither my time nor my opportunity is equal to more than the merest superficial account of the great orchards and vineyards extending from the Napa Valley of the north to the San Diego and the San Gabriel of the south.

As we near the foot-hills on the western slope of the Sierra Nevadas the cultivation of the apple becomes manifest in small but well cultivated orchards. As we approach the valley of the Sacramento, orchards of the peach, pear, and plum, as well as market gardens, are seen, apparently under the best management and care.

Perhaps no other given space has Nature signalized with so great a variety of climate and products, as that of forty miles from the mountain to the foot-hills and the valley, which challenges the attention of all who have a fondness for her works.

Having seen this most charming and wonderful feature of landscape and cultivation, we arrive at the City of Sacramento to find a banquet in readiness at the State Capitol for the Grangers and their invited guests. Four hundred or more were seated at the tables, which were most bountifully supplied with the fruits, flowers, wines, and other products of the State, and no State can entertain guests with more generous hospitality. No State can set a table more temptingly arranged,—loaded with only the products of her own soil, than can California. Not only may be found fish and fowl with all the domestic meats, and all of the vegetables used in civilized communities, but the greatest

variety of fruits. The apple, the pear, the peach, the persimmon, the plum and prune, the apricot, and grapes in great variety; also the fig, orange, lemon, lime, olive, guava, and banana, with almonds, chestnuts, pecans, English walnuts,— in fact every product, seemingly, can be grown in California—and who can want more? In her flora is found an equally great variety, and in either summer or winter they are in readiness to decorate the houses and rooms and banquets with the best effect. Fruits and flowers were in great profusion, with a *boutonnière* of exquisite beauty and taste at each plate. Following the example of the ladies of California, which we deemed worthy of imitation, we tasted the wines and other good cheer, and congratulated the Californians that they could sit under their own vines and fig-trees, feast upon their abundance, and have a large surplus for their less fortunate neighbors. The company was made up of representatives from all the States of the Union excepting four,— delegates from the Granges and their invited guests, including many State officials. After the banquet, music and speeches were in order, all expressive of good feeling and good cheer. Taking it as a whole—the hall, the decorations, the tables, and the company, the banquet may well be described as of the highest order.

The ranch of General Bidwell, at Chico, of about 30,000 acres, is one of the finest I saw in California. The grounds about the mansion are tastefully embellished with beautiful trees in endless variety as well as flowering shrubs and plants, artistically grouped and looking remarkably thrifty. There were also on the place beautiful orchards of the cherry,—the finest I ever saw. The trees were very shapely and some of the trunks measured five feet in diameter. Those trees were probably planted about thirty-five years ago. There were extensive orchards of apple trees, shapely and well cared for; also large orchards of the peach, with well pruned branches, and very many trunks were each more than a foot in diameter. Orchards of the plum and apricot were extensive, set in rows absolutely straight, and with the high culture bestowed upon them all they could not help producing abundant crops.

The plantations of the fig were, to our unaccustomed eyes, very unique. I should think the trees reached the height of nearly if not quite sixty feet, and a diameter of trunk of two feet or even more; it was certainly the finest orchard of the fig I saw in Cal-

ifornia. I was told that the fig produces three crops in the year. The stock of almond and English walnut and chestnut trees was large and well cultivated, but the native forest trees were of the most stately and gigantic growth. The live-oaks were immense, with sturdy trunks and symmetrical tops. We saw one gray oak, the branches of which extended sixty-three by seventy-three feet, and it was said that seven thousand men could stand beneath its shade. We also saw well bred and well kept cattle and swine in large numbers. In short this ranch was superlative in all its features and appointments; a truly grand spectacle both agriculturally and horticulturally speaking and such as the eye can feast upon but is impossible fitly to describe.

Upon this ranch were mills for grinding grain, mostly wheat; establishments for canning fruits, and substantial stables for horses and cattle. In every department excellent care seemed manifest.

A colony of Digger Indians having become civilized dwell on this estate, and they are given employment in gathering fruits, and performing other farm work.

We next paid a visit to Vina, the plantation and vineyard of Senator Stanford, of 55,000 acres. Here is a vineyard of 4,000 acres planted with wine grapes. In the vaults were stored 4,700,000 gallons of wine, contained in casks of two thousand gallons capacity. The wines of California are in great diversity, made from different varieties of grapes. Perhaps a dozen leading sorts are largely exported and sent east. It may, however, be termed the native beverage, and is largely used in the State.

We next visited Woodland and there, it being Sunday, attended church in the forenoon. In the afternoon we left for Santa Rosa, passing through a very fertile valley about sixty miles in length, where we saw great numbers of live stock. Large vineyards and orchards and market gardens are seen along this route. Santa Rosa is the seat of Sonoma County. It is situated in the valley of Santa Rosa, one of the richest and most beautiful valleys, sixty miles in length and sixty miles in width. The streets are well paved and bordered with the eucalyptus and other trees. Leaving early in the morning, we had but little opportunity to visit the places of interest in which Santa Rosa abounds.

On the way to San Francisco we pass through a valley abounding in agricultural wealth. We noted Jersey cattle on many

farms, and fine gardens and residences, which apprized us of our near approach to a large city. On reaching San Francisco we were quartered at the Palace Hotel, one of the largest and finest in the world, where I spent six days with a great deal of comfort and satisfaction. The city abounds in public parks and squares. The Golden Gate Park contains 1,013 acres, the Government reservation at Presidio 1,200 acres, Buena Vista 20 acres, Mountain Lake 20 acres, and other city squares comprise 119 acres. Our first move was for Golden Gate Park, in the western portion of the city. Originally it was a barren waste of sand, but now it is a very attractive and charming spot, well planted with trees and shrubs. Plants that with us are grown under glass grow out of doors there, and many were in full bloom at this season, November 15th. Fuschias were growing in hedges, and many other plants which we usually grow under glass were permanently set in the open ground, many of them attaining the size and form of trees. The conservatory is 250 feet in length and contains a fine collection of choice plants. The improvements were commenced in 1874 and now many of the trees, deciduous and evergreen, are quite large,—even stately. But it must be borne in mind that one growing season in California is about equal to one and a half of ours. The drives are well graded and macadamized, and on pleasant afternoons are filled by the turnouts of the city. Vast sums of money have been expended on this park. We were made acquainted with the Superintendent, G. M. Murphy, who kindly showed us the places of especial interest.

The Board of Trade Rooms were quite an interesting feature. Here are on exhibition the products of the several counties of the State, either in a green or preserved condition. These products were mostly large, indicating rich lands and a long season. There were squashes weighing 304, 208, 195, and 176 pounds and so on; a beet 154 pounds; onions six and one-half pounds; sweet potatoes twenty-eight pounds; pears five pounds; peaches twelve inches round, and other products in proportion. I will only touch upon the productive industry of the State. The gold and silver products since 1848 are $2,789,207,538; the coinage at the mint to 1886 is $847,694,237. The banking capital is $45,000,000. Thus will be seen the vast wealth from the mines alone. The productive industry of this State is immense and yearly increasing.

After two days sojourn in San Francisco we left for the southern portion of the State, our first destination being Menlo Park, in which is the residence of Senator Stanford, named Thurlow Lodge. Here we were charmed with the groves of live-oaks. The drives are through groves of beautiful pine, eucalypti, and other trees. Palms as well as flowering shrubs and plants of all kinds, are seen in great profusion. Deer parks and ornamental gardens render the drives and grounds princely.

A drive of a mile or more over finely graded avenues brought us to the Leland Stanford, Jr., University. The buildings, now in course of construction, are to be of granite and sandstone. We were told that this university has an endowment of large estates valued at $20,000,000. Its purpose is to educate the young men of California, and it is regarded as the most magnificent gift ever made to that State. A short drive through fine fields filled with horses of different ages, brought us to the stables, where are kept the finest stud of horses probably to be found in America. Some of the most noted of these horses were led out for our inspection. At the same time the celebrated horse Sanol was being tried on the track in presence of Mr. Robert Bonner.

Returning to the station we took cars for San Jose, a beautiful little city, surrounded by fine orchards and vineyards. There we were driven out to see an olive orchard, and were favored with a most excellent lunch, where olives, grapes, and wine were in perfection and superabundant; also a very dainty dish called *resota*, composed in the main of chicken and rice, cooked and incorporated with other nourishing and seasoning aliments. It was most highly appreciated and commended by the whole company. The proprietor, Mr. Goodrich, made a graceful and finished speech, complimentary to the company, and as agreeable as was his abounding hospitality. The olive groves seemed perfection in their planting and cultivation. The trees were remarkable for their symmetry of shape and uniformity of size. The grapes were the best we found in California—long, elegant clusters of highly colored fruit. The atmosphere of the whole place indicated the most refined care and supervision.

After an hour or more most pleasantly spent we returned to the city of San Jose where we were comfortably quartered at the hotels for the night, the day's excursion having been most delightful.

In the evening a banquet was given in Horticultural Hall. The Hall was finely decorated and the arrangement of the tables was very unique—unlike anything we had seen, but the effect was charming, loaded as they were with the products of the State most tastefully displayed. After a sumptuous repast speaking was in order, which together with most excellent music held the company to a late hour.

After a good night's rest we took our train for Monterey, situated on the southern extremity of the Bay of Monterey. A short ride brought us to our first stop, at Del Monte, situated near the Bay of Monterey. From the station we walked through a beautiful avenue shaded with live-oaks and conifers seemingly old as the hills, approaching the famous Hotel Del Monte, which was built within two or three years to replace one that was burned. This hotel is situated in the centre of a natural park of two hundred acres. Here were some of the largest and tallest pines we saw on the trip. Though native trees, by Nature planted, they were grouped for the most charming effect, each tree in its grandeur seeming indispensable to the others. Beneath their shade was fine artificial planting of the Cacti in great variety, as well as all other desirable ornamental plants. The roses, which seem to receive especial attention, were in full bloom November 28. At this hotel we took our Thanksgiving lunch. The dining room was well filled and ample justice was done to the bill of fare.

There is a "Labyrinth" here, planted with a species of cedar, in hedge form, with intricate paths. Our company seemed to have but little difficulty in getting in, but there was a great deal of noise and confusion in getting out. We were told of some who failed to find their way out and had to remain over night.

I have never seen a spot where everything seemed so entirely wrapped up in Nature—in fact where Nature seemed so entirely supreme; where trees of gigantic growth have lived for ages and still look vigorous and well preserved. The hotel with its surroundings seems to have an air of royal and generous hospitality, as well as an indescribable kindly rural aspect. Monterey is favored with a beautiful contour of country and ocean in close proximity; and they seem to unite most happily, with no rugged waste in view. As we neared the beach curious shells were found, of which many were gathered by our party. The harbor is crescent-

shaped and very beautiful to look upon. The Old Mission Church is one of the most ancient buildings, and there are also several old fortifications. The town is curiously tame and seems satisfied with itself.

We arrived at Los Angeles on Monday morning, December 2, and breakfasted at the station. We were then invited to carriages and rode about the city and suburbs. We drove through miles of vegetable gardens and orchards, which surrounded the city in all directions. All kinds of fruits and vegetables seem to thrive; they were in all stages of growth and represent a great industry. The city is well laid out with wide streets, but while some portions were well paved others were wet and muddy. Shade trees were abundant; the live-oak, pine, cypress, pepper, eucalyptus, sycamore, poplar, palm, etc., were most conspicuous. Orange, lemon, lime, pomegranate, and fig trees were to be seen in every yard, and grand mountains loomed up in the distance.

Before noon we took the cars for Alhambra, a beautiful town in the San Gabriel valley, seven miles from Los Angeles; a pleasant ride of thirty minutes brought us to our destination, where we dined. Teams were in readiness to convey us about the place and through the orange groves, which seemed to occupy all the lands about. The ride was a delightful one. Everything was new to us. 44,000 bearing orange trees with extensive orchards and vineyards seemed to stretch away for miles. Our time was short and at 3 P. M. we were in the cars for San Diego, about 53 miles distant. There we arrived at dark and supped at the station, after which another ride over a neck of land fifteen miles long brought us to the Grand Hotel Del Coronado, where we were glad to retire for the night.

The Hotel Coronado is deservedly called one of the first hotels in California. It is said to cover five acres of ground rising gradually from the beach. It contains rooming capacity for twelve hundred persons. The dining room is the largest I have ever seen. It is shaped like the famous Mormon Tabernacle; is finished in oak of the natural color of the wood and is beautifully frescoed; it is said that it will accommodate a thousand persons. After a refreshing night's rest and an excellent breakfast, we take the cars, return over the neck of land to National City, and thence a distance of seven miles to Rosarito, at the Mexican line. Here we find a few houses, a custom house, and some half-breeds of

Indians and Mexicans. Through an interpreter we had an informal introduction to the officials, and after some pleasant interchange of compliments took our departure. On our return trip we stopped first at the residence of one of the Kimball Brothers. There we went through the groves planted with the orange, lemon, olive, and guava; also through the grounds about the residence, which were planted with ornamental trees and flowering plants. Roses were in perfection, being in superb bloom, the buds showing most exquisite form and color. After passing through the grounds and mansion, and it being about noon, each member of the party was presented with a basket containing a very delicate and appetizing lunch covered with a Japanese napkin, and on each basket was a *boutonnière* of the most exquisite flowers. Lemonade was freely served and partaken of; it was made from lemons to the manor born and was deliciously refreshing and duly appreciated.

With lunch in hand we boarded the cars again for a trip to the famous Sweetwater Dam, built by the San Diego Land and Town Company at a cost of $200,000. It is designed to supply the city with water and also to irrigate lands in the vicinity. The dam presents a fine appearance. It is a strong, durable, and handsome structure, and the reservoir, which has the capacity of 6,000,000,000 gallons, covers an area of seven hundred acres. Resuming our journey, we next stopped at some large orange groves, which were under excellent management, the trees being loaded with fine fruit, now approaching ripeness. On our arrival at San Diego we were shown to the rooms of the Chamber of Commerce, where we found an exhibition of fruits, vegetables, and flowers. All were well arranged and showed the intelligent care bestowed upon their cultivation. After some speeches we repaired to the ferry boat and were soon landed again at the Hotel Del Coronado, where we took supper. Later on the company met in one of the large parlors, for an interchange of speeches of a complimentary nature, which proved very interesting to us. We were really the guests of Messrs. F. A. and W. C. Kimball, formerly of Massachusetts, and we acknowledged as best we could our heartfelt gratitude for their kindness and generous hospitality, as nowhere else in the State were we shown more liberal and considerate attention.

The next morning, December 3, we recrossed the ferry and taking the cars going north visited the famous orange groves at Riverside. We found it a beautiful place covering an area of 25,000 acres. The orange groves and vineyards occupy the whole place and the very best care and skill are manifest everywhere. The city and county have a population of about 7,000. It is a city of magnificent avenues and residences. The avenues are tastefully planted with palms and pepper trees and nothing can surpass them in their grace and beauty.

After viewing Riverside and receiving the hospitalities of the citizens, which were most generous, we reëntered the cars for Los Angeles, and on our arrival were quartered at the hotels for the night. All were tired, and desired rest from the constant strain and excitement of the ten days excursion and banquets, which were kept up without any intermission. We needed to prepare ourselves for the grand finale on the following morning, when the tour of the Grangers over the State of California was to end and the party to separate. The pleasant associations and incidents, the hallowed memories, the dignified, graceful, and charming courtesies we received during our absence from home and friends, made the farewell truly heartfelt, and prompted the wish that we might reciprocate such generous hospitality. We feel that henceforth our houses shall be open to the Californians if they ever come to sojourn among us. We can only hope that we have been worthy of the attentions which we received as visitors to their glorious State, and we know and feel that their kindness must ever keep a green spot in our memories while life lasts. The final parting at the railroad station, where the larger part were gathered to go eastward to their homes, was a scene such as the most of us never before witnessed. An express wagon came loaded with Navel oranges in baskets for our refreshment by the way, supplemented with bottles of native wine, of which one was presented to each member of the party. Governor Robie, of Maine, mounted the wagon and made the parting speech, commending the people for their generous hospitality; praising the great agricultural resources of the State, with its mountains, its foot-hills, and vast valleys, and thanking all who had so generously contributed to the welfare and pleasure of the party. All was expressed with his charming felicity of speech, which flows so easily upon every occasion. The cry, "all aboard!" was heard

from the conductor, cheers were given with a will, the locomotive gave its resounding puff, the wheels turned on their axles, and the train soon took the visitors out of sight. The mind of each one of the travellers was filled with wonder and amazement at the scenes which formed the indescribable panorama of this excursion. Their cups of pleasure and happiness were filled to the brim as they wended their way homeward, thinking, as they will ever think, of their very pleasant visit to California.

Perhaps the most pleasing spot in California, if not in the world, is Passadena and its vicinity. The great stretch of the San Gabriel valley of fifty miles, with the Sierra Madre mountain range on the north and east, from four thousand to five thousand feet high and reaching back for forty miles, is seen; as the eye follows the range it discerns further back Old Baldy, eleven thousand feet high, snow-capped the year round. Turning to the west the Virdugos loom up, and nearer the foot-hills and ridged hills, which on the 10th of December were clothed with foliage of pea-green hue. From the Raymond hill, the site of the Raymond Hotel, can be seen the most charming scenery, combining mountains, hills, the vast valley and through a gap in the hills the Pacific Ocean, with the city of Passadena in full view, and a fertile and highly cultivated country, planted with the trees and orchards of a semi-tropical climate.

The grounds around the Raymond, about fifty acres, are only recently planted but, in a very few years will form an arboretum in themselves. Here I saw the greatest variety of trees, both indigenous and foreign. The flowers about the grounds, by far surpassed any I saw elsewhere. La France Roses,— if the rose is the Queen of flowers, La France is the Queen of Roses,— are grown about the Raymond in the greatest abundance, with the finest buds and flowers,—three times as large as we usually see them in New England. The tea and other tender roses seemed perfectly at home in the open air. Connected with the grounds are glass houses for orchids and tender plants. Roses are also extensively planted in cheap houses where glass can be used in case of rain storms. The hotel was virtually surrounded with flowers, and they all seemed kindly to bloom when most needed, and were fully appreciated by the guests of the house. The planting is under the supervision of Charles H. Hovey, formerly of Boston, and the gardener, James Barratt, was with Charles M. Hovey for twenty years. The Hotel

Raymond is not only delightfully situated but is admirably kept. It is one of those hotels that are plain but luxurious. One feels as though everything to be desired in a hotel was there. The scenery grew upon me every day, and I can now view it in my mind's eye as the finest I have ever witnessed.

I should like to describe some private places, but having taken more than the allotted time must close by commending California to all who have a fondness for the unlimited charms of Nature, which seem so ever varied over that State.

A vote of thanks to Mr. Hadwen for his interesting paper was proposed, and as this was the last of the series of meetings for the discussion of horticultural subjects the present season, William D. Philbrick moved that the vote include the thanks of the Society to the Committee on Publication and Discussion for the interesting and instructive papers and lectures which they had provided, and in this form the vote was unanimously passed.

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TRANSACTIONS

OF THE

Massachusetts Horticultural Society,

FOR THE YEAR 1890.

PART II.

BOSTON:
PRINTED FOR THE SOCIETY.
1891.

TRANSACTIONS

OF THE

Massachusetts Horticultural Society.

BUSINESS MEETING.

SATURDAY, April 5, 1890.

This was the day for the stated meeting of the Society, which was duly notified, but no quorum was present, and the meeting was

Adjourned to Saturday, May 3, at 11 o'clock.

BUSINESS MEETING.

SATURDAY, May 3, 1890.

An adjourned meeting of the Society was holden at 11 o'clock, the President, WILLIAM H. SPOONER, in the chair.

The Secretary read a letter from Hon. Henry L. Dawes, acknowledging the receipt of the Resolutions and Memorial of the American Forestry Congress in regard to the preservation of forests on the national domain, with the approval of this Society, and expressing his hearty approval thereof.

A letter was also presented from the Hingham Agricultural and Horticultural Society, giving notice of the appointment of Samuel Pratt, of Hingham Centre, to have the free use of the Library and Room of this Society during the year 1890, for the purpose of preparing essays to be read at Institutes of that Society.

The following named persons, having been recommended by the Executive Committee, were on ballot duly elected members of the Society.

Michael J. Flynn, of Roxbury.
John J. Merrill, of Roxbury.
Warren Ewell, of Dorchester.
Franklin H. Beebe, of Boston.
Isaac Y. Chubbuck, of Roxbury.
Charles H. Smith, of Providence, R.I.

Adjourned to Saturday, June 7.

BUSINESS MEETING.

Saturday, June 7, 1890.

An adjourned meeting of the Society was holden at 11 o'clock, the President, William H. Spooner, in the chair.

Joseph H. Woodford, Chairman of the Committee on Plants and Flowers, moved that the Committee of Arrangements be authorized to supply moss for the rose boxes at the coming Rose Exhibition, at a cost not exceeding $10. The motion was carried.

Mrs. H. L. T. Wolcott, Chairman of the Committee on Window Gardening, stated that in consequence of the additional duties devolved upon that Committee by vote of the Society on the 29th of March, more funds would be required, and asked for an additional appropriation of $150. The subject was referred to the Executive Committee.

The Secretary read a letter from Dr. Robert P. Harris, of Philadelphia, on the Potato, designed to awaken interest in the cultivation of wild North American species, for the production of new and hardy varieties. On motion of Leverett M. Chase, the letter was referred to the Committee on Vegetables, and ordered to be published in the Transactions.

The letter is as follows: —

Philadelphia, April 10, 1890.

To the Massachusetts Horticultural Society: —

The interests of Potato Culture in the United States require that an early repetition of the work of the late Rev. Channcy E.

Goodrich, of Utica, N.Y., should be made, and new seedlings be produced from developed wild tubers, not of South American stock, — under which he had eleven out of twelve varieties fail, in consequence of the long season required for the growth of hot-climate tubers, — but from North American wild stock, such as may be dug up in Washington Territory, California, Arizona, Texas, and Mexico.

From one Chilian potato Mr. Goodrich produced the Rough Purple Chili, the seed of which again produced the Garnet Chili, which was the father of Bresee's Early Rose, the most noted American White Potato that has yet been produced by seed-culture. Through this Early Rose has been produced a new dynasty of hardy tubers, originating in its Chilian grandfather, and our tables are now chiefly supplied by one or other of the descendants of this potato-line. But this stock, after more than thirty years, has begun, like that of the Mercer, to die out. Can any one now produce a true Garnet Chili? The value of the Early Rose, and its adaptation to certain soils, still preserves it in some sections, as in the State of Maine, where it appears to grow in its original quality. But here, no doubt, we have history only repeating itself, for those who are old enough will remember the Maine Mercers, as they were sold in New York and Philadelphia long after their failure in the Middle States.

The potato-rot of 1844 and 1845 started Mr. Goodrich in his humanitarian scheme of obtaining hardiness by cultivating and disseminating seedlings from wild potato stock, and such was his zeal and activity during sixteen years prior to his death in 1864, — although much of the time in poor health from lung trouble, — that he produced from thirteen thousand to fifteen thousand tuber-seedlings. He unfortunately died before the Garnet Chili family could be seen in its full development, and, sad to say, in poverty; but his country honors his name today for the great good he accomplished in his last years, and he is regarded in Europe as having commenced a new era in potato culture. When we consider that the loss by the potato-rot in the British Isles alone was estimated at $50,000,000 for its maximum year, and that the disease produced a famine in Ireland, we can learn to value the expedients which restored a healthy condition of crops, and were thereby the means of saving life.

To prepare for the future results of deterioration, the work of

raising new varieties from wild stock should be commenced at once, and be undertaken by the younger horticulturists, as it will be the labor of some years to effect a full fruition. Wild American potatoes vary in size from that of a pea to that of a marble, and first crop seedlings are as large as buckshot. The former will generally require seven seasons to bring them to full size, and the latter four seasons. The soil should be fed with the proper materials to make the tubers enlarge, and for this purpose a dressing of wood ashes will be found available.

Wild potatoes are early, late, and too late for our climate. They are white-fleshed, yellow-fleshed, round, oval, and oblong. The plants are erect, semi-pronate, and recumbent, spreading over a wide surface; bearing white or purple flowers, but chiefly white. Some will bear seed-balls when cultivated; others will not. Seeds may produce varieties by accident, or as the result of hybridization effected by hand or insect fertilization. "Sports" from underground change will also produce changes upon the original tuber planted. Such are liable to a repetition, and gardeners have less faith in them. Potato plants that blossom but do not bear fruit can be made productive by hand-fertilizing, or by planting another variety in alternate hills; the Early Rose has been made to bear seed-balls in this latter way.

By a wise provision of the Creator wild potatoes always remain very small in their native soil unless cultivated; but for which they would exhaust the land and die out. In South America they grow on lofty plateaux like that of Quito (9,500 feet), or Bogota (8,500 feet), on the sides of the Andes at suitable elevations, and often have a season of eight months' activity, after which the newly formed tubers remain dormant for four months, when they in turn sprout. The soil is largely replenished by the dying of the old tubers and plants, just as that of a forest is by the formation of leaf-mould.

The pecuniary value of a new seedling potato may be very great, as is shown by the history of the Early Rose, which brought as high as $2 for a single five-ounce tuber. As there would be one hundred and ninety-two such potatoes — or sixty pounds — in a bushel, the price would be equivalent to $384 for a bushel. From $2 to $3 for a pound was often obtained, and $20 for a peck was considered reasonable. These prices do not appear so extravagant when we bear in mind that the five-ounce potato was made to pro-

duce one hundred and fifty plants, which yielded four hundred and fifty pounds, or seven and a half bushels, and that one pound (four potatoes) has produced two thousand plants, and nineteen hundred and eighty-two pounds, or thirty-three bushels of potatoes. The second season of the Early Rose brought the price down to $10 per bushel, the third year to $3, and the fourth to an edible valuation.

Yours very respectfully,
ROBERT P. HARRIS.

The following named persons, having been recommended by the Executive Committee, were on ballot duly elected members of the Society.

William Thomas Park, of Boston.
Robert C. Winthrop, Jr., of Boston.
A. Chandler Manning, of Reading.
William O. Rogers, of Chelsea.

The meeting was then dissolved.

BUSINESS MEETING.

Saturday, July 5, 1890.

A duly notified stated meeting of the Society was holden at eleven o'clock, the President, William H. Spooner, in the chair.

The President, as Chairman of the Executive Committee, reported a recommendation that the Society make an additional appropriation of $150 for the use of the Committee on Window Gardening, to be expended under the joint approval of the President and the Chairman of the Committee on Window Gardening. The report was accepted and adopted, and the appropriation was voted.

The Executive Committee also recommended to the Society the adoption of the following amendment to the Constitution and By-Laws: —

Add at the end of Section 1 the words "and *provided* also that no person shall be eligible to the office of Treasurer or Secretary who is not a member of the Society."

The following substitute for the amendment offered by the Executive Committee was offered by Joseph H. Woodford and seconded by George W. Warren : —

In the last clause of Section 1, which now reads "provided, however, that no person shall be eligible to the office of President unless he shall have been a member for the three years preceding," strike out the word "the" before "office" and insert "any," and strike out the words "of President," so that the clause shall read : —

"Provided, however, that no person shall be eligible to any office unless he shall have been a member for the three years preceding."

The question was taken on the substitute offered by Mr Woodford, and it, having been read twice, was by a unanimous vote ordered to be entered on the records, to lie over for consideration at the quarterly meeting in October.

The Executive Committee further recommended that the Committee of Arrangements be authorized to hire Music Hall for the Exhibition of Plants and Flowers, August 19–22, which recommendation was unanimously adopted.

The following named persons, having been recommended by the Executive Committee for membership in the Society, were on ballot duly elected.

William Wallace Lunt, of Hingham.
James Rankin, of Dorchester.
Charles V. Whitten, of Dorchester.
W. Henry White, of Lowell.

Adjourned to Saturday, August 2, 1890.

BUSINESS MEETING.

Saturday, August 2, 1890.

An adjourned meeting of the Society was holden at eleven o'clock, the President, William H. Spooner, in the chair.

Ex-President William C. Strong presented, with some appropriate remarks, the following memorial of the late Patrick Barry; and moved its adoption.

The Massachusetts Horticultural Society desires to express and to place on record its high appreciation of the services in the field of horticulture, of the late Patrick Barry, of Rochester, N.Y., a Corresponding Member of this Society.

More than forty years ago Mr. Barry entered upon his work as a nurseryman at a time when the business was in its infancy at the West. Since then, in connection with his partner, he has pursued the profession with such skill, enterprise, and integrity as to place the house in the front rank, and to give it a world-wide reputation. And this credit and success have been won without a resort to extravagant descriptions of "novelties," but rather by a judicious selection and production of articles of sterling merit which might with reason be expected to benefit the public. Yet, valuable as Mr. Barry's work has been in the distribution of immense quantities of trees and plants for so long a period, it is probable that his public services will be regarded as of still more importance. As Chairman of the Fruit Committee of the American Pomological Society, Mr. Barry was called upon to catalogue and arrange the entire list of varieties of fruits recommended for general cultivation in North America. The ability and thoroughness with which he commenced and completed this task, embracing every State in the Union, and also the Dominion of Canada, is recognized by fruit cultivators as a permanent monument to his praise.

As editor of "The Horticulturist," succeeding the honored Downing, and as an author and frequent writer upon Fruit Culture, Mr. Barry has also obtained a deservedly high reputation. Of his success in other departments of life it is not our province to speak. In whatever he engaged he played his part well. We honor his memory while we mourn his loss. And while we extend to his family our sympathy in their sorrow, we must also add our congratulations on their rich inheritance of his example — a well-spent life.

Robert Manning seconded the motion to adopt the memorial, and said that on the departure of a friend whom he had long known, his mind always went back to the time of their first meeting, and to a review of their long friendship. He had a vivid recollection of the occasion when he first met Mr. Barry. It was when the Pomological Garden at Salem — which was established by the father of the speaker — was a place to which pilgrimages

of fruit growers were directed, — for there could be seen more varieties of fruit trees in bearing, especially pears, than anywhere else in this country. It was then and there that he received a call from Mr. Barry. It was not the less pleasant for being entirely unexpected, and he knew that his guest was pleased with what he saw in that garden. They met again soon afterwards at the first Pomological Congress, and also from time to time, when they were associated in labors connected with that Society, besides on occasional visits of Mr. Barry to Boston. Mr. Manning recalled especially a four weeks' journey in the South with Mr. Barry, Col. Wilder, and Mr. Ellwanger. He did not believe a pleasanter or more harmonious party ever travelled together. He always thought of Mr. Barry as a true and sincere man, who never gave forth an uncertain sound; a man of quick perception and sound judgment, — two qualities not always united in the same individual.

Benjamin G. Smith said he had been much with Mr. Barry, and thought that whoever had the pleasure of knowing him could never forget him. He was a man of great individuality, — a mirror of manhood. He was at the first meeting of the American Pomological Society, and acted as its Secretary. He always manifested a strong and active interest in that organization, and his labors for promoting its welfare and objects ceased only with his life.

The memorial was unanimously adopted.

The Secretary read a circular from the Illinois State Horticultural Society, inviting all National, State, and other prominent horticultural and floral societies and kindred organizations to send two delegates each to a convention to be held in Chicago, August 27, to consider and take action on the best method of properly representing the horticultural interests of the country at the World's Columbian Exposition in 1893. It was voted to accept the invitation, and the President appointed as delegates, Benjamin G. Smith and O. B. Hadwen, with power to appoint substitutes.

Joseph H. Woodford stated that the expense of supplying moss for the rose boxes, agreeably to the vote passed on the 7th of June, had amounted to $18, — a larger sum than it was then supposed would be required. On his motion the Treasurer was authorized to pay the bill for the moss.

Ex-President Strong moved that the members of the Society of

American Florists be admitted to the Exhibition of Plants and Flowers in the Music Hall by their badges, which motion was carried.

Patrick Norton moved that the same invitation be extended to the Association of American Cemetery Superintendents, and this motion was also carried.

Agreeably to the Constitution and By-Laws, the President appointed the following Committee to nominate suitable candidates for the various offices of the Society for the year 1891 : —

James F. C. Hyde, *Chairman.*

C. H. B. Breck,	Benjamin G. Smith,
Nathaniel T. Kidder,	Patrick Norton,
E. W. Wood,	Warren Heustis.

William J. Stewart, Secretary of the Gardeners and Florists' Club, of Boston, stated that the Club would give a harbor excursion to the Society of American Florists, and invited the Ex-Presidents, and the present officers and chairmen of committees of the Massachusetts Horticultural Society, with ladies, to join in the excursion. The invitation was accepted, and the thanks of the Society were voted therefor.

The Librarian laid before the Society ten volumes of works on Forestry, presented to the Library by the author, John Croumbie Brown, LL.D., of Edinburgh, Scotland, and moved that the thanks of the Society be presented to him for his valuable gift. The motion was unanimously carried.

Adjourned to Saturday, September 6.

BUSINESS MEETING.

Saturday, September 6, 1890.

An adjourned meeting of the Society was holden at 11 o'clock. the President, William H. Spooner, in the chair.

James F. C. Hyde, Chairman of the Committee on Nominations, reported a printed list of candidates for Officers and Standing Committees. The report was accepted, and it was voted that the Committee be continued, and requested to nominate candidates in place of any who might decline before election.

Joseph H. Woodford moved that the thanks of the Society be presented to all the contributors of Special Prizes at the Annual Exhibition of Plants and Flowers in August, as these prizes added greatly to the attractions and success of the Show, and that the Secretary notify each contributor of the above vote.

The motion was unanimously carried.

The Secretary read a letter from William C. Barry, of Rochester, N.Y., acknowledging the receipt of the memorial of his father, the late Patrick Barry, adopted at the last meeting of the Society, and conveying the thanks of the family for this expression of sympathy and regard.

Also a letter from William J. Stewart, Secretary of the Society of American Florists, communicating a resolution of thanks for the use of the Society's halls for their late meeting, and for the magnificent Exhibition of Plants and Flowers, which symbolized their gathering as had never been done before.

Also a letter from John Simpkins, President, and F. C. Swift, Secretary, of the Barnstable Agricultural Society, thanking this Society for its courtesy in offering the free use of the Library to aid in preparing papers to be read at the institutes of that Society, and accepting the invitation, with the appointment of Mr. Nathan Edson, of Barnstable, to be the representative of that Society for the purpose above mentioned.

It was voted that these letters be placed on file.

Patrick Norton, Chairman of the Committee of Arrangements, moved that the thanks of the Society be presented to His Honor Thomas N. Hart, Mayor of the City of Boston, and to the City Government, for the interest manifested by them in this Society by granting to it the use of the Common for the August Exhibition, and that the Secretary notify the Mayor and City Government of the above vote.

Also that the thanks of the Society be presented to the Press of Boston for their kind and appreciative notices of the late Exhibition, which contributed largely to its success, and that the Secretary communicate this vote to the various newspapers to which we are indebted.

Both these motions were unanimously carried.

The meeting was then dissolved.

BUSINESS MEETING.

SATURDAY, October 4, 1890.

A stated meeting of the Society, being the Annual Meeting for the choice of Officers and Standing Committees, was holden at eleven o'clock, the President, WILLIAM H. SPOONER, in the chair.

The Recording Secretary stated that the requirements of the Constitution and By-Laws in regard to notice of the meeting had been complied with.

On motion of Edmund Hersey, Chairman of the Committee on Large and Interesting Trees, it was voted that Francis H. Appleton be added to the Committee.

The amendment to the Constitution and By-Laws, changing the last clause of Section 1 so as to read, "*Provided*, *however*, that no person shall be eligible to any office unless he shall have been a member for the three years preceding," which at the stated meeting in July received a majority of votes and was ordered to be entered on the records, came up for final action, and two-thirds of the members present voting in favor of said amendment, it was declared by the President to be adopted as a part of the Constitution and By-Laws.

On motion of Joseph H. Woodford, Chairman of the Committee on Plants and Flowers, it was voted as the sense of the meeting that an additional appropriation of three hundred dollars should be made for the use of that Committee the present year.

It was then voted to proceed to the election of officers and standing committees for the year 1891, and that the polls be kept open for one hour.

Agreeably to the Constitution and By-Laws the Chair appointed John C. Hovey, I. Gilbert Robbins, and William J. Hargraves a Committee to receive, assort, and count the votes given and report the number. The polls were opened at twenty-eight minutes past eleven o'clock.

The Secretary laid before the Society a letter from the Oxford Agricultural Society announcing that the Hon. J. W. Stockwell had been appointed to have the free use of the Library of this Society, agreeably to the circular dated February 15, 1890.

WALTER RAYMOND, of Cambridgeport,

having been recommended by the Executive Committee, was, on ballot, duly elected a member of the Society.

The polls were closed at twenty-eight minutes past twelve o'clock, and the Committee to receive, assort, and count the votes, reported the whole number of ballots to be 105
Necessary for a choice 53

The report of the Committee was accepted, and the persons reported as having the number of ballots necessary for a choice were, agreeably to the Constitution and By-Laws, declared by the President to have a majority of votes and to be elected Officers and Standing Committees of the Society for the year 1891.

Adjourned to Saturday, November 1, 1890.

BUSINESS MEETING.

SATURDAY, November 1, 1890.

An adjourned meeting of the Society was holden at eleven o'clock, the President, WILLIAM H. SPOONER, in the chair.

The President, as Chairman of the Executive Committee, reported from that Committee a recommendation that the Society appropriate the sum of $6,800 for prizes for the year 1891, this amount to be apportioned among the several committees as deemed best by said committees. The report was accepted, and agreeably to the Constitution and By-Laws was laid over until the stated meeting on the first Saturday in January next for final action.

Francis H. Appleton stated that the plate for Members' Diplomas was much worn, and moved that the subject of repairing it or providing a new plate be referred to the Committee on Publication. It was so referred.

The Secretary stated that when the amendment to the Constitution and By-Laws was proposed on the first Saturday in July, 1889, it was itself amended so as to provide for a Committee on Plants of five members instead of three, and that this change having been overlooked when the nomination of officers and committees was made, two vacancies existed in the Committee. On motion of Joseph H. Woodford, it was voted that the three members-elect of

this Committee be requested to report to the Society at the next meeting the names of two members whom they would recommend to fill these vacancies.

Hon. William H. Haile, of Springfield, and
Thomas B. Fitz, of West Newton,

having been recommended by the Executive Committee, were, on ballot, duly elected members of the Society.

Adjourned to Saturday, December 6, 1890.

BUSINESS MEETING.

Saturday, December 6, 1890.

An adjourned meeting of the Society was holden at eleven o'clock, the President, William H. Spooner, in the chair.

The President announced the decease of Mrs. Francis B. Hayes, and said that as a contributor to the weekly exhibitions of the Society no one was more constant; she never needed urging. She was also noted for her generous hospitality which she was specially pleased to show to this Society.

The President, as Chairman of the Executive Committee, presented the Schedule of Prizes prepared by the Committee on Establishing Prizes, with the recommendation that it be amended by the offer of Prospective Prizes for Herbaceous Pæonies, Tuberous-Rooted Begonias, and Chrysanthemums; that the Prospective Prizes for Flowers be made uniformly fifty dollars; that Chrysanthemum plants exhibited for prizes be required to be single stemmed, branching above ground; and that in the prize for forty Chrysanthemum plants in six-inch pots, the words "each bearing a single bloom" be stricken out. These amendments were carried, excepting the last.

On motion of Joseph S. Chase, it was voted that three prizes for Herbert Grapes be offered at the October exhibition.

The Schedule was then adopted.

Frederick L. Harris, Chairman of the Committee-elect on Plants, to which was referred the nomination of two members to fill the vacancies in that Committee, presented the names of Azell C.

Bowditch and William Robinson. The report was accepted and adopted, and the gentlemen named were elected to fill the vacancies in the Committee on Plants.

On motion of Francis H. Appleton, of the Committee on Publication, to which the matter of the Society's Diploma was referred, it was voted to continue the Diploma in its present form.

The Annual Report of the Committee on Plants and Flowers was read by Joseph H. Woodford, Chairman, accepted and referred to the Committee on Publication.

The Annual Report of the Committee on Fruits was read by E. W. Wood, Chairman, accepted and referred to the Committee on Publication.

Charles N. Brackett, Chairman of the Committee on Vegetables, asked further time to prepare his report; which was granted.

On motion of William E. Endicott, Chairman, it was voted that the Library Committee be authorized to employ such assistance as is necessary to complete the rearrangement and cataloguing of the Library.

The Secretary read a letter from Frank Higgins, Secretary of the Association of American Cemetery Superintendents, expressing the thanks of that Association for the courtesy shown to its members and their ladies, in providing them with complimentary tickets to the Exhibition of Plants and Flowers, held at Music Hall during their Fourth Annual Convention in August last. It was voted that the letter be placed on file.

The following-named persons, having been recommended by the Executive Committee, were, on ballot, duly elected members of the Society: —

Everell F. Sweet, of Malden.
Charles W. Quinn, of Roxbury.
Frederick C. Becker, of Cambridge.
George D. Wilcox, M.D., of Providence, R.I.

Adjourned to Saturday, December 20.

BUSINESS MEETING.

SATURDAY, December 20, 1890.

An adjourned meeting of the Society was holden at eleven o'clock, the President, WILLIAM H. SPOONER, in the chair.

The President announced the decease of Warren Heustis, of Belmont, and spoke of him as a member of this Society for many years; a valued member of the Committee on Vegetables; a skilful cultivator of vegetables; the originator of the Belmont Strawberry; a lover and grower of roses; a good friend; a pleasant and honest man, and one of the class of men who have made Arlington and Belmont the market garden of Boston. It was voted that a delegation from the Society attend the funeral of Mr. Heustis, and that their expenses be paid by the Society.

Charles N. Brackett, Chairman of the Committee on Vegetables, read the Annual Report of that Committee.

William E. Endicott, Chairman of the Library Committee, read the Annual Report of that Committee.

William C. Strong, member from this Society of the Board of Control of the State Agricultural Experiment Station, read a report of the doings of the Station.

Mrs. H. L. T. Wolcott, Chairman of the Committee on Window Gardening, read the Annual Report of that Committee.

Robert Manning read his Annual Report as Secretary and Librarian.

These reports were severally accepted and referred to the Committee on Publication.

Joseph H. Woodford, from the Committee of Arrangements, read a portion of the Annual Report of that Committee, which was accepted and referred to the Committee for completion.

It was voted that a committee of three be appointed by the Chair to prepare a memorial of the late Mrs. Francis B. Hayes. The Chair appointed as that Committee, Mrs. E. M. Gill, Mrs. A. D. Wood, and Joseph H. Woodford.

The Secretary laid before the Society a circular from the Michigan Horticultural Society, accompanied by a classification of objects to be exhibited in the Horticultural Department of the

coming Chicago Exposition, which the Michigan Society deemed so faulty that they asked the coöperation of sister societies in the endeavor to secure a more proper classification. The subject was referred to the Committee of Arrangements.

The Secretary also presented circulars from a committee appointed by the conference held on the twenty-fourth of May last by persons interested in the Preservation of Beautiful and Historical Places in Massachusetts, asking the coöperation and assistance of every historical, improvement, and out-door society in the State. This subject was referred to the Executive Committee.

The meeting was then dissolved.

REPORT

OF THE

COMMITTEE ON PLANTS AND FLOWERS,

FOR THE YEAR 1890.

By JOSEPH H. WOODFORD, Chairman.

The year which is now approaching its close has been a memorable one in the history of our Society. The season has been favorable for the development of both plants and flowers, and our stated exhibitions have been crowded with the very best specimens of these we have ever seen.

The gardeners seem to have taken advantage of every known method to improve and perfect the growth of their plants and flowers, so that they have been enabled to exhibit them in their most attractive forms and best conditions.

The "Boston Daily Advertiser" of August 7, said: "The part that flowers play in life today is a striking and creditable feature of modern civilization. The result has not come about of its own accord. It is due in a great measure to the energy of a comparatively few enthusiasts who have labored to extend the beneficent influence of floral beauty. In this work there is no one agency that can look back on a more honorable record than the Massachusetts Horticultural Society. Its founding, its growth, and its vicissitudes during the sixty odd years of its existence, cover about all that is worth knowing of the history of horticulture." It is a very pleasant thing to have the indorsement of so able and so venerable a newspaper as the "Advertiser."

One great stimulant with the gardeners this year to produce superior cultivation, was the knowledge that the Society of Ameri-

can Florists would hold their annual convention in this city, and that our Society had tendered to them the use of our halls for that purpose. We had also arranged to hold our Annual Exhibition of Plants and Flowers during the same week as the Convention.

To enable us to do so with credit to ourselves, we engaged Music Hall in which to display the wonderful collections of plants and flowers contributed from the private stoves and greenhouses of some of our opulent members.

The combined collection was the most superb and beautiful of any gathering together of plants ever beheld in this country, and elicited unbounded praise from every visitor and florist present.

This season the number of contributors has largely increased, and several of our members, who had in late years become weary in well-doing, have returned to their former allegiance, and have contributed from their abundance, so that our shows during the past year have been complete, and have received the most favorable mention possible by the public press, and by distinguished visitors from all parts of our own country and from abroad.

This state of things is very gratifying to your Committee, and it becomes a pleasure under such circumstances to chronicle the events as they have developed themselves during the year now closing. Therefore we will now specify some of the most notable features of the exhibitions as they occurred.

On January 4, John L. Gardner showed a fine plant of *Cattleya Percivaliana* and a *Kalanchoe carnea*, the latter of which was awarded a First Class Certificate of Merit.

On January 11 and 18, James Comley showed fine blooms of his rose Francis B. Hayes, and on January 25, the seedling rose Oakmount. John L. Gardner also showed some fine Orchids.

February 1, Jackson Dawson showed a cross between the Hybrid Perpetual Rose, Gen. Jacqueminot, and *Rosa Japonica multiflora*, giving a miniature rose of a deep pink color, quite full and very fragrant.

On February 15, James Comley again showed very fine blooms of the seeding rose Oakmount.

February 22, Norton Brothers showed a new Tea Rose, Luciole; its color, a bright pink and yellow.

March 1, Jackson Dawson exhibited four seedling Indian Azaleas, of good substance and clear colors; also a box containing about forty plants of *Cypripedium acaule* in full bloom. This

was a fine exhibition of one of our hardy native orchids. William H. Spooner showed the Tea Rose Hon. Edith Gifford. This rose is after the style of the Gloire de Dijon, but lighter in color.

March 8, Charles J. Dawson sent in some branches of forced hardy shrubs, Moss Pinks, and Mayflowers (*Epigæa repens*).

March 15, Augustus P. Calder exhibited a beautiful collection of Roman Anemones, the finest specimens we have ever seen; and William H. Spooner and Mrs. Francis B. Hayes showed large collections of forced Hybrid Perpetual and Tea Roses in perfect form and condition.

SPRING EXHIBITION.

March 26, 27, and 28.

This exhibition was superb, and there were more contributors of plants and flowers than usual, so that nearly all the prizes were awarded.

The Indian Azaleas exhibited by Nathaniel T. Kidder were fine large plants, and well worthy of the Lyman Plate which they received. Indian Azaleas were also shown by Joseph H. White, Dr. C. G. Weld, and Edward Butler.

The display of Orchids was also very grand, coming from E. W. Gilmore, Nathaniel T. Kidder, Jackson Dawson, John L. Gardner, and Edward Butler.

The forced Roses displayed were of the finest quality and in abundance, and were from Mrs. Francis B. Hayes, Thomas H. Meade, E. M. Wood & Co., Ernest Asmus, of West Hoboken, N.J., Thomas Clark, Charles W. Galloupe, William H. Elliot, Augustus P. Calder, and Norton Brothers. Mr. Asmus was awarded a First Class Certificate of Merit for the new Tea Rose Madame Hoste, a very pale yellow rose of large size and good form.

Denys Zirngiebel exhibited one hundred and fifty blooms of the Bugnot and Cassier strains of Pansies, which were of superior excellence.

The displays of Carnations by William Nicholson and Richard T. Lombard were particularly good, and embraced a large number of the best kinds.

The competition for prizes on Holland Bulbs was the most marked for years, and all the prizes but three were taken. Al-

though we did not have the Holland medals as an incentive this year, we were pleased to see so much interest manifested in these plants, which give such good results with a minimum amount of care.

The large number of plants contributed by Norton Brothers, Frank Becker, William E. Doyle, and the Botanic Garden of Harvard University, formed a splendid feature of the Exhibition and elicited many expressions of commendation, as did also the *Lilium Harrisii* shown by Dr. C. G. Weld, Thomas Clark, and Thomas H. Meade.

April 12, Mrs. Francis B. Hayes presented a seedling Rhododendron, named William Power Wilson. The color is white, tinged with pink, having a reddish-brown blotch, a good, large, and compact truss; it is said to be hardy. It was awarded a First Class Certificate of Merit. It has been entered for the Prospective Prize.

On April 26, Mrs. P. D. Richards made her first exhibition of Wild Flowers, consisting of seventeen varieties of the flowers which bloom in the spring.

MAY EXHIBITION.

May 10.

The competition for prizes was not so marked at this exhibition as is usually the case, owing to the prevailing fine weather, which was taken advantage of by the gardeners to get their grounds ready for planting. Nevertheless, there was a very good show, particularly of plants not entered for prizes.

A. W. Spencer was awarded the Society's Silver Medal for a fine plant of *Anguloa Clowesii;* and Jacob W. Manning was awarded a First Class Certificate of Merit for *Spiræa astilboides*, a new herbaceous plant of great promise.

RHODODENDRON SHOW.

June 7.

This exhibition fully realized the expectations which had been formed in regard to it. The largest exhibitors were H. H. Hunnewell, who showed sixty-four of the best varieties, all named, besides a very large number unnamed; and Mrs. Francis B. Hayes,

whose contributions more than filled the whole centre table running the length of the lower hall. Fine collections of trusses of Rhododendrons were sent in by Joseph H. White, John L. Gardner, Nathaniel T. Kidder, Edwin Sheppard & Son, Joseph Clark, and from Newton Cemetery.

Mrs. Hayes also showed several plants of *Bignonia præcox superba*, from Japan; a superb addition to the class of hardy drooping shrubs. This was awarded a First Class Certificate of Merit.

John L. Gardner was awarded a First Class Certificate of Merit for *Utricularia nelumbifolia*.

June 14, we had a continuation of the Rhododendron Exhibition, and the display made by Mrs. Francis B. Hayes fairly eclipsed the grand show she made the Saturday previous. She staged more than five hundred trusses, comprising more than one hundred varieties of the best kinds grown. We cannot say too much in praise of this great exhibition of grand flowers, but, as a slight expression of appreciation of their merit, she was awarded the Society's Gold Medal, which is the highest award we can confer, and well she deserved the honor.

ROSE EXHIBITION.

June 24 and 25.

It is gratifying to be able to record the fact that this Rose Show was an unqualified success.

The arrangement of the hall was such that on entering one saw nothing in bloom but roses. "Taverner," the correspondent of the "Boston Post," wrote: "I do not remember a finer collection of magnificent specimens." A contributor to "Garden and Forest," also wrote as follows: —

"The Roses as a whole were distinguished by a remarkable evenness of excellence which must have made judging a difficult matter; by good foliage and by flowers well colored, but not of such enormous size as these shows have sometimes called out. Not the least attractive part of this exhibition was the display of Foxgloves grouped on the stage at the end of the upper hall, which produced a remarkable and striking effect."

It is well to have our own opinions confirmed by such reliable

authorities. There were other plants at this exhibition deserving special notice, such as the Japan and native hardy roses and shrubs contributed by Jackson Dawson, the Canterbury bells (Dean's Strain) by R. & J. Farquhar & Co., and the display of Foxgloves on the stage by Joseph H. Woodford.

WEEKLY EXHIBITIONS.

The weekly Saturday exhibitions began this year early in July and continued into September. The shows have been very full, and have been well attended. The prizes for herbaceous plants, having been revised and made more nearly adequate to the labor required in staging large collections properly, have again received the attention of growers, and we have had especially fine exhibitions of these throughout the season.

July 12 was memorable for the grand display of Japan Irises. It was the best show of this beautiful plant we have ever seen.

July 19, the special object of interest was the great collection of that old-fashioned flower, the Hollyhock. Joseph S. Fay, of Wood's Holl, brought a large number of long spikes of the finest varieties, filling the centre table in the lower hall, and he was awarded the Society's Silver Medal for the grand display he made.

July 26, the place of honor was allotted for the display of Native Ferns, and splendid collections were brought in by Mrs. P. D. Richards, Walter E. Coburn, and E. H. Hitchings. Unless one is familiar with this order little does he realize the beauty and grace expressed in their varied forms. Mrs. P. D. Richards staged fine specimens, comprising fifty species and varieties.

August 2 was Sweet Pea Day, and the displays made by James F. C. Hyde, George S. Harwood, and H. A. Jones were particularly good. This is one of the most satisfactory flowers that a person can grow, for it produces its beautiful, fragrant blossoms continuously from early in July till the frost kills the vines.

August 9, Perennial Phloxes and Native Plants held the right of way, and a hall full of charming flowers was the result.

August 30, the display of Asters was very good, notwithstanding a new disease has attacked them.

September 6, Pitcher & Manda, of Short Hills, N.J., showed a hybrid *Cypripedium*, named by them *Arnoldianum*, a cross between *Veitchii* and *concolor*. It was awarded the Society's Silver Medal.

ANNUAL EXHIBITION OF PLANTS AND FLOWERS.

August 19, 20, 21, and 22.

The Annual Exhibition of Plants and Flowers was held this year in August at Music Hall, so as to give the National Convention of the Society of American Florists a chance to see some of the collections of choice plants as grown by our opulent members for their own gratification. One of the newspapers said: "The exhibit this year is the largest and most complete in the history of the Society, and is a well-nigh exhaustive exposition of horticultural art." Another newspaper said: "Music Hall has presented the past week a scene of exceeding beauty, and all adjectives expressive of admiration could find no better work than to free themselves amid the tropical charms of the Massachusetts Horticultural Society's beautiful exhibition."

There were several features out of the ordinary course connected with this show which we must recount. The first, and one to be commended, was the offering of prizes for Decorations of Dining-Tables and Mantlepieces. The four compartments devoted to these displays were very beautiful and attractive, and gave all observers an idea, or foretaste, of how delightful it must be to dine at such lovely tables while listening to the strains of entrancing music.

But the most gratifying feature of our exhibition was the very friendly spirit manifested by the following-named persons and firms in offering special prizes of plate, to the value of $820, to be competed for at this show, viz.: —

Abram French & Co., of Boston.
R. & J. Farquhar & Co., of Boston.
Marshall B. Faxon, of Boston.
The Society of American Florists.
American Florist, Chicago.
Henry A. Dreer, Philadelphia.
Peter Henderson & Co., New York.
Parker & Wood, Boston.
American Agriculturist, New York.
J. C. Vaughan, Chicago.
Benjamin Grey, Malden.
Siebrecht & Wadley, New York.

John Gardiner & Co., Philadelphia.
American Garden, New York.
Bowker Fertilizer Co., Boston.
George Johnson & Co., Boston.

Another feature which we must not omit to mention was the delightful music, afternoon and evening, by the Germania orchestra. This was a charming and appropriate accompaniment to the exhibition, and greatly increased the enjoyment of visitors.

George A. Nickerson brought in the best colored and finest Croton — Queen Victoria — ever seen in our halls, and he was awarded the Society's Silver Medal. Mrs. J. Lasell sent a splendid new Alocasia which was brought into this country from the Malayan Archipelago in the year 1884 by David Allan, and she was awarded a Silver Medal. W. R. Smith, of the Botanic Garden at Washington, D.C., brought a very large collection of Carnivorous Plants, which were wonderfully curious and interesting, and he was awarded the Society's Silver Medal. Robert Cameron, of the Botanic Garden at Cambridge, brought in a large collection of Cacti of most peculiar formation, and he also received the Society's Silver Medal.

In fact, we might go on indefinitely enumerating the wonderful, the curious, and the beautiful productions of nature which were staged in Music Hall, but even then we should convey no adequate idea of the floral loveliness revealed at this exhibition, unless the reader had seen it.

CHRYSANTHEMUM EXHIBITION.

November 11, 12, 13, and 14.

The grand final exhibition of the floral productions of the year is the Chrysanthemum Show, and this year gave us very marked improvement in the size, style, and finish of the blooms. A new enemy has appeared in the shape of a small beetle, which commits such depredations on plants in the open ground that it is almost impossible to protect them from total denudation of flower-buds. Plants grown all summer in the house, where sulphur and tobacco are used, come into flower as usual. But not every one has the space indoors to accomplish this, therefore our exhibition did not secure an over-abundance of plants, yet those we did have were

generally of larger size, and in other respects finer specimens, than were exhibited last year.

The arrangement of the lower hall, wherein the cut flowers were staged, was excellent, and never in the history of our Society was there a larger or better show of cut flowers.

The flowers grown by S. J. Coleman, gardener to Charles J. Powers, and exhibited by himself and Galvin Brothers, were the largest and best finished flowers ever seen in our halls. Mr. Coleman was awarded the Society's Silver Medal for superior cultivation of Chrysanthemums in general, and T. D. Hatfield received the same for superior cultivation of the Chrysanthemum Mrs. Alpheus Hardy, of which he showed a fine large plant bearing upwards of one hundred large blooms.

Henry A. Gane, one of our most enthusiastic growers of Seedling Chrysanthemums, exhibited a large number of seedlings, — most of them of superior merit, — and he was awarded the Appleton Silver Medal for his collection.

The more we become acquainted with the Nee Sima Collection of Chrysanthemums, which were sent to Mrs. Hardy, the more we are convinced that it is the very best collection ever sent out of Japan.

A Seedling Orchid — a very beautiful Calanthe — was shown by Richard Gardner. It is a cross between *C. vestita* and *C. vestita rubro-oculata*, and gained the award of the Society's Silver Medal.

E. M. Wood & Co. have established a sport from the Tea Rose Catherine Mermet, which they have named Waban. This is vivid pink in color, and of the same form and comeliness as the parent, and also its sister, The Bride. It received the Society's Silver Medal.

The displays of hardy herbaceous plants made by Jacob W. Manning during the season have been very fine, and the manner he has adopted in labelling them, with both the botanical and common names, and adding the name of their native country, is greatly to be commended. He won the award of the Appleton Silver Medal.

The amount appropriated by the Society for the use of our Committee was $3,300, and out of this we have awarded in Prizes, Medals, and Gratuities, $3,272.

We cannot close this report without reverting to the great loss

our Society has very lately sustained by the death of Mrs. Francis B. Hayes. She always stood ready to further our interests in any manner most conducive to the progress of horticulture, and we shall miss her genial presence and cordial welcome; but the memory of her benevolence and kindly deeds will always remain with us. May she rest in peace.

In taking leave of the Plant and Flower Committee the Chairman wishes to thank the other members for the courtesy and forbearance shown him during the years they have been associated.

All of which is respectfully submitted.

JOSEPH H. WOODFORD,
F. L. HARRIS,
M. H. NORTON,
A. H. FEWKES,
W. J. STEWART,
J. H. MOORE,
E. H. HITCHINGS,

Committee on Plants and Flowers.

PRIZES AND GRATUITIES AWARDED FOR PLANTS AND FLOWERS.

JANUARY 4.

Gratuity : —

John L. Gardner, *Cattleya Percivaliana* $5 00

JANUARY 25.

Gratuity : —

John L. Gardner, Orchids, *Cattleya Trianæ* (two), *Toxicophlæa spectabilis*, and *Vanda Amesiana ;* also *Boronia megastigma*, and Violets 5 00

MARCH 1.

Gratuity : —

Jackson Dawson, Box of *Cypripedium acaule*, forty blooms . . 2 00

MARCH 8.

Gratuity : —

Charles J. Dawson, Two plants of *Pyrus spectabilis* . . . 2 00

SPRING EXHIBITION.

MARCH 26, 27, AND 28.

Theodore Lyman Prizes.

INDIAN AZALEAS. — Six distinct named varieties, in pots, Nathaniel T. Kidder, the Lyman Plate, value $35 00

ORCHIDS. — Ten plants in bloom, E. W. Gilmore, the Lyman Plate, value 30 00

Second, Nathaniel T. Kidder, the Lyman Plate, value . . 25 00

Society's Prizes.

INDIAN AZALEAS. — Four distinct named varieties, in not exceeding ten-inch pots, Joseph H. White 10 00

Second, Joseph H. White 8 00

Two distinct named varieties, Dr. C. G. Weld 6 00

Second, Dr. C. G. Weld 4 00

Specimen plant, named, Edward Butler 4 00

Single plant, of any named variety, in not exceeding an eight-inch pot, Joseph H. White	$3 00
Second, Dr. C. G. Weld	2 00
Hybrid Perpetual Roses. — Twelve cut blooms, of not less than six distinct named varieties, excluding Gen. Jacqueminot, Mrs. Francis B. Hayes	6 00
Six cut blooms, distinct named varieties, Mrs. Francis B. Hayes	4 00
Tender Roses in Vases. — Twelve blooms of Catherine Mermet, Thomas H. Meade	5 00
Second, Edmund M. Wood & Co.	4 00
Twelve blooms of Cornelia Cook, Edmund M. Wood & Co.	5 00
Second, Thomas H. Meade	4 00
Twelve blooms of Mme. de Watteville, Ernest Asmus, West Hoboken, N.J.	5 00
Twelve blooms of Papa Gontier, Thomas H. Meade	5 00
Twelve blooms of The Bride, Edmund M. Wood & Co.	5 00
Second, Thomas Clark	4 00
Twelve blooms of any variety of Yellow Tea, Thomas H. Meade, Perle des Jardins	5 00
Orchids. — Three plants in bloom, John L. Gardner	12 00
Second, E. W. Gilmore	8 00
Single plant in bloom, Edward Butler	6 00
Second, Nathaniel T. Kidder	5 00
Third, E. W. Gilmore	3 00
Stove or Greenhouse Plant. — Specimen in bloom, other than Azalea or Orchid, named, John L. Gardner	8 00
Second, Mrs. Francis B. Hayes	6 00
Hardy Flowering Shrubs, Forced. — Four, in pots, of four distinct named varieties, John L. Gardner	6 00
Second, Charles J. Dawson	5 00
Cyclamens. — Ten plants in bloom, Dr. C. G. Weld	8 00
Second, Mrs. Mary T. Goddard	6 00
Three plants in bloom, Dr. C. G. Weld	3 00
Second, Mrs. Mary T. Goddard	2 00
Single plant in bloom, Thomas Clark	2 00
Hardy Primroses and Polyanthuses. — Ten plants, of distinct varieties, in bloom, Thomas Clark	5 00
Second, Dr. C. G. Weld	4 00
Cinerarias. — Six varieties in bloom, in not over nine-inch pots, Thomas Clark	6 00
Second, Nathaniel T. Kidder	5 00
Third, Dr. C. G. Weld	4 00
Violets. — Six pots, in bloom, Nathaniel T. Kidder	3 00
Second, Nathaniel T. Kidder	2 00
Pansies. — Six distinct varieties, in pots, in bloom, Joseph S. Fay	2 00
Fifty cut blooms in the Society's flat fruit dishes, Denys Zirngiebel	4 00

Second, Denys Zirngiebel	$3 00
Third, " "	2 00
CARNATIONS. — Display of cut blooms, with foliage, not less than six varieties, in vases, William Nicholson	5 00
Second, Richard T. Lombard	4 00
CENTRE PIECE FOR TABLE. — Last day of the Exhibition, Mrs. E. M. Gill	10 00
Second, Mrs. A. D. Wood	8 00

SPRING FLOWERING BULBS.

HYACINTHS. — Twelve distinct named varieties in pots, one in each pot, in bloom, John L. Gardner	10 00
Second, Nathaniel T. Kidder	8 00
Third, Thomas Clark	6 00
Six distinct named varieties in pots, one in each pot, in bloom, John L. Gardner	6 00
Second, Nathaniel T. Kidder	5 00
Third, Dr. C. G. Weld	4 00
Three distinct named varieties in pots, one in each pot, in bloom, Dr. C. G. Weld	4 00
Second, John L. Gardner	3 00
Third, Thomas Clark	2 00
Single named bulb in pot, in bloom, Thomas Clark	2 00
Second, Dr. C. G. Weld	1 00
Three pans, ten bulbs of one variety in each pan, Nathaniel T. Kidder	10 00
Second, Thomas Clark	8 00
Third, Dr. C. G. Weld	6 00
Two pans, ten bulbs of one variety in each pan, Thomas Clark	8 00
Second, Dr. C. G. Weld	6 00
Third, John L. Gardner	5 00
Single pan, with ten bulbs of one variety, Thomas Clark	5 00
Second, Dr. C. G. Weld	4 00
Third, " " " "	3 00
TULIPS. — Six six-inch pots, five bulbs in each, in bloom, Nathaniel T. Kidder	5 00
Second, Arthur H. Fewkes	4 00
Three six-inch pots, five bulbs in each, in bloom, Dr. C. G. Weld,	4 00
Second, Arthur H. Fewkes	3 00
Third, " " "	2 00
Three pans, ten bulbs of one variety in each pan, John L. Gardner	6 00
Second, Nathaniel T. Kidder	5 00
Third, Dr. C. G. Weld	4 00
Fourth, W. S. Ewell & Son	3 00
POLYANTHUS NARCISSUS. — Four seven-inch pots, three bulbs in each, in bloom, Dr. C. G. Weld	6 00

Second, Dr. C. G. Weld	$4 00
Hardy Narcissus and Daffodils. — Twelve pots, not less than six varieties, Dr. C. G. Weld	8 00
General Display of Spring Bulbs. — All classes, Charles J. Dawson	12 00
Second, Thomas Clark	10 00
Third, W. S. Ewell & Son	8 00
Lilium Longiflorum, or Harrisii. — Three pots, not exceeding ten inches, Dr. C. G. Weld	8 00
Second, Thomas Clark	6 00
Lily of the Valley. — Six six-inch pots, in bloom, W. S. Ewell & Son	5 00
Second, John L. Gardner	4 00
Third, Nathaniel T. Kidder	3 00
Anemones. — Three pots or pans, Thomas Clark	4 00
Freesias. — Six pots or pans, Nathaniel T. Kidder	5 00
Ixia Crocata. — Six pots, John L. Gardner	4 00
Second, Nathaniel T. Kidder	3 00
Roman Hyacinths. — Six pots or pans, John L. Gardner	4 00
Second, Nathaniel T. Kidder	3 00
Gratuities: —	
William E. Doyle, Display of Palms, Crotons, Lilies, Astilbe, and Ferns	25 00
F. Becker, Display of Palms, Araucarias, Sweet Bays, etc.	20 00
Botanic Garden, Cambridge, Display of Agaves, Cacti, Ferns, etc.,	20 00
Temple & Beard, Ten Plants	10 00
Nathaniel T. Kidder, Seventy Plants	10 00
William C. Strong, Thirty-two Evergreens	10 00
Norton Brothers, Fourteen Rhododendrons and Orchids, and Cut Flowers	8 00
John L. Gardner, Ten pots of Plants and Twelve pots of Bulbs	5 00
Charles J. Dawson, Thirty pots of Hardy Herbaceous Plants	5 00
Nathaniel T. Kidder, Orange Tree	5 00
John L. Gardner, Eleven Orchids	5 00
E. W. Gilmore, Twelve Orchids	5 00
Edward Butler, *Cattleya amethystoglossa*	1 00
William C. Strong, Eight pots Hydrangeas	1 00
Mrs. Mary T. Goddard, Twelve pots *Primula obconica*	1 00
Joseph S. Fay, Twenty pots Pansies	2 00
T. Rowland, Five pots Mignonette	2 00
Mrs. E. M. Gill, Eleven pots Tulips	2 00
Dr. C. G. Weld, Seven pots *Narcissus bulbocodium*	1 00
Thomas H. Meade, Three Lilies and Twenty-four Tea Roses	3 00
Mrs. Francis B. Hayes, Three Hundred Hybrid Perpetual Roses	15 00
Norton Brothers, Two vases Roses, Gabriel Luizet and Ulrich Brunner	3 00
William H. Elliott, Four vases Hybrid Perpetual Roses	3 00

C. W. Galloupe, Eight vases Hybrid Perpetual Roses and Pinks . $4 00
Ernest Asmus, West Hoboken, N.J., Five vases roses, Mme. Cusin, Catherine Mermet, Mme. Hoste, and Mme. de Watteville . 2 00
Augustus P. Calder, Two vases Papa Gontier roses 1 00
Augustus P. Calder, Four vases Anemones and Ranunculuses . . 1 00
Mrs. E. M. Gill, Cut Flowers 1 00

MAY EXHIBITION.

May 10.

Indian Azaleas. — Six plants in pots, named, John L. Gardner . $10 00
Single specimen, Nathaniel T. Kidder 4 00
Second, John L. Gardner 3 00
Calceolarias. — Six varieties, in pots, John L. Gardner . . 6 00
Second, Nathaniel T. Kidder 5 00
Single plant, Dr. C. G. Weld 2 00
Second, Nathaniel T. Kidder 1 00
Tulips. — Twenty-four blooms, distinct named varieties, Dr. C. G. Weld 6 00
Basket of Flowers. — Mrs. A. D. Wood 6 00
Second, Mrs. E. M. Gill 5 00
Pansies. — Fifty cut blooms, in the Society's flat fruit dishes, Isaac E. Coburn 4 00
Herbaceous Plants. — Jacob W. Manning, forty-seven species . 4 00

Gratuities : —

Edwin Sheppard & Son, Pelargoniums, Pinks, etc. 8 00
John L. Gardner, Azalea 3 00
A. W. Spencer, Calceolarias 2 00
Nathaniel T. Kidder, *Cattleya intermedia* 3 00
John L. Gardner, *Cypripedium Haynaldianum* 3 00
Norton Brothers, *Dendrobium Jamesianum* 3 00
Joseph H. White, Gloxinias and Begonias 2 00
Dr. C. G. Weld, *Erica Cavendishiana* 2 00
William S. Ewell & Son, Lilies of the Valley 1 00
H. H. Hunnewell, Rose W. A. Richardson 1 00
Mrs. Francis B. Hayes, Cut Flowers 1 00
Mrs. P. D. Richards, Wild Flowers 2 00
E. H. Hitchings, Wild Flowers 1 00

May 24.

Gratuities : —

Mrs. Francis B. Hayes, Flowering Trees and Shrubs . . . 3 00
Mrs. P. D. Richards, Native Plants 2 00

May 31.

Gratuities : —

H. H. Hunnewell, Rhododendrons and Azaleas 3 00

Mrs. Francis B. Hayes, Hardy Shrubs, etc.	$2 00
Joseph Comley, Gen. Jacqueminot Roses	1 00

RHODODENDRON SHOW.

June 7.

H. H. Hunnewell Premiums.

Rhododendrons. — Twelve trusses, distinct hardy varieties, named, in the Society's vases, Mrs. Francis B. Hayes, a piece of plate, value	$20 00
Second, John L. Gardner, a piece of plate, value	15 00
Eighteen tender varieties, named, Mrs. Francis B. Hayes	8 00
Ten tender varieties, named, Mrs. Francis B. Hayes	5 00
Second, Mrs. Francis B. Hayes	4 00
Six tender varieties, named, Mrs. Francis B. Hayes	3 00
Single truss of any tender variety, named, Joseph Clark	1 00
Hardy Azaleas, from any or all classes. — Fifteen named varieties, one truss each, Mrs. Francis B. Hayes	8 00
Six named varieties, one truss each, the second prize to Benjamin G. Smith	2 00

Society's Prizes.

German Iris. — Six distinct named varieties, one spike of each, the second prize to Jacob W. Manning	2 00
Clematis. — Named varieties, display of cut blooms, with foliage, Joseph H. Woodford	4 00
Hardy Pyrethrums. — Display, the third prize to Joseph H. Woodford	1 00
Hardy Flowering Trees and Shrubs. — Largest and best collection, named, cut blooms, Nathaniel T. Kidder	6 00
Second, Joseph S. Fay	5 00
Basket of Flowers. — Mrs. A. D. Wood	5 00
Second, Mrs. E. M. Gill	4 00
Herbaceous Plants. — Jacob W. Manning	4 00
Native Plants. — Display of named species and varieties, one vase of each, Mrs. P. D. Richards	4 00
Second, E. H. Hitchings	3 00

Gratuities: —

H. H. Hunnewell, Sixty-four named Rhododendrons, and others	10 00
Joseph Clark, Rhododendrons	2 00
E. Sheppard & Son, Rhododendrons, Azaleas, etc.	3 00
John L. Gardner, " and Azaleas	2 00
Mrs. Francis B. Hayes, Indian Azaleas	2 00
Mrs. Francis B. Hayes, Display of flowers	10 00
Newton Cemetery " "	5 00

Joseph H. Woodford, Three vases of flowers	$3 00
Mrs. A. D. Wood, One vase "	1 00
Joseph Comley, Vase of Jacqueminot Roses	1 00
Leverett M. Chase, Pæonies	1 00

JUNE 14.

Gratuities: —

Miss Ellen M. Harris, Pæonies	2 00
Benjamin D. Hill, Clematis	3 00
Joseph H. Woodford, Pyrethrums, etc.	2 00

ROSE EXHIBITION.

JUNE 24 AND 25.

Special Prize, Theodore Lyman Fund.

HARDY PERPETUAL ROSES. — Twenty-four distinct named varieties, three of each, John B. Moore & Son	$35 00
Second, Warren Heustis & Son	30 00
Third, William H. Spooner	25 00

Special Prize, offered by President William H. Spooner.

ULRICH BRUNNER. — For the best twelve blooms, Mrs. Francis B. Hayes	10 00

Regular Prizes.

HARDY PERPETUAL ROSES. — Sixteen distinct named varieties, three of each, John B. Moore & Son	25 00
Second, Warren Heustis & Son	20 00
Twelve distinct named varieties, three of each, John L. Gardner	20 00
Second, John B. Moore & Son	15 00
Six distinct named varieties, three of each, Joseph H. White	15 00
Second, John B. Moore & Son	10 00
Three distinct named varieties, three of each, Dr. C. G. Weld	10 00
Second, Joseph H. White	8 00
Third, John B. Moore & Son	5 00
Twenty-four distinct named varieties, one of each, John L. Gardner	15 00
Second, William H. Spooner	10 00
Third, John B. Moore & Son	8 00
Eighteen distinct named varieties, one of each, William H. Spooner	12 00
Second, Mrs. Francis B. Hayes	8 00
Twelve distinct named varieties, one of each, Mrs. Francis B. Hayes	10 00
Second, John L. Gardner	6 00
Third, William H. Spooner	4 00

Six distinct named varieties, one of each, Dr. C. G. Weld	$6 00
Second, Joseph H. White	4 00
Third, John B. Moore & Son	3 00
Three distinct varieties, one of each, Warren Heustis & Son	3 00
Second, John L. Gardner	2 00
Third, Warren Heustis & Son	1 00
Moss Roses. — Six distinct named varieties, three clusters of each, John B. Moore & Son	6 00
Second, John L. Gardner	4 00
Third, Joseph S. Fay	3 00
General Display of One Hundred Bottles of Hardy Roses, J. B. Moore & Son	10 00
Second, Edwin Sheppard & Son	9 00
Third, John L. Gardner	8 00
Fourth, Mrs. Francis B. Hayes	7 00
Fifth, Mrs. E. M. Gill	6 00
Stove and Greenhouse Flowering Plants. — Two distinct named varieties, in bloom, no Orchid admissible, Nathaniel T. Kidder	15 00
Second, Nathaniel T. Kidder	10 00
Specimen Plant in Bloom. — Named, other than Orchid, John L. Gardner	7 00
Orchids. — Six plants, of six named varieties, in bloom, John L. Gardner	20 00
Second, E. W. Gilmore	12 00
Three plants, of three named varieties, in bloom, John L. Gardner	10 00
Second, Nathaniel T. Kidder	8 00
Single specimen, named, John L. Gardner	6 00
Second, Nathaniel T. Kidder	5 00
Herbaceous Pæonies. — Ten named varieties, Thomas C. Thurlow,	8 00
Second, William C. Strong	6 00
Sweet Williams. — Thirty spikes, not less than six distinct varieties, Edwin Sheppard & Son	4 00
Second, L. W. Goodell	3 00
Third, Dr. C. G. Weld	2 00
Vase of Flowers. — Best arranged, in one of the Society's glass vases, Mrs. A. D. Wood	5 00
Second, Mrs. E. M. Gill	4 00
Gratuities: —	
Joseph S. Fay, Display of Hardy Perpetual Roses	20 00
Jackson Dawson, Japan and Native Hardy Roses and Shrubs	10 00
Norton Brothers, One hundred bottles Hardy Perpetual Roses	6 00
Mrs. Francis B. Hayes, Rhododendrons	5 00
Edwin A. Hall, Kalmia	1 00
Thomas C. Thurlow, Red and White Kalmia	1 00
Joseph H. Woodford, Display for the Platform	15 00

Jacob W. Manning, One hundred varieties of Hardy Trees and Shrubs	$5 00
William C. Strong, Foliage Trees and Shrubs	2 00
Benjamin D. Hill, Pæonies	1 00
Miss Ellen M. Harris, Pæonies and Sweet Williams	1 00
Newton Cemetery, Irises and Sweet Williams	2 00
Edwin Sheppard & Son, Pelargoniums, etc.	2 00
Walter E. Coburn, Pelargoniums	1 00
Nathaniel T. Kidder, Four Pelargoniums	1 00
Richard T. Lombard, Pinks, etc.	1 00
Neale Boyle, Stock Gilliflower	1 00
William S. Ewell & Son, Campanulas, etc.	1 00
Marshall B. Faxon, Pansies	1 00
R. & J. Farquhar & Co., Canterbury Bells (Dean's strain)	2 00
Jacob W. Manning, Herbaceous Plants	3 00
Miss Sarah M. Vose, Basket of Flowers	1 00
Mrs. E. M. Gill, Basket of Flowers	1 00
E. H. Hitchings, Native Plants	2 00
Mrs. P. D. Richards, Native Plants	2 00

JULY 5.

LILIUM CANDIDUM. — Twelve spikes, Leverett M. Chase	4 00
Second, Nathaniel T. Kidder	3 00
Gratuities: —	
John L. Gardner, Delphiniums	2 00
Anthony McLaren, "	2 00
William C. Strong, *Iris Kæmpferi*	1 00
Charles J. Dawson, Poppies	1 00
Mrs. E. M. Gill, Basket of Flowers	3 00
Miss Sarah M. Vose, " "	2 00

JULY 12.

HARDY CARNATIONS. — Twelve cut blooms, distinct varieties, tree or tender kinds not admissible, Charles Jackson Dawson	3 00
Second, William C. Winter	2 90
IRIS KÆMPFERI. — Fifteen varieties, three of each, in vases, John L. Gardner	8 00
Second, William C. Strong	6 00
Third, Newton Cemetery	5 00
Six named varieties, three of each, in vases, John L. Gardner	4 00
Second, William C. Strong	3 00
BASKET OF FLOWERS. — Mrs. A. D. Wood	5 00
Second, Mrs. E. M. Gill	4 00
VASE OF FLOWERS. — Mrs. E. M. Gill	4 00
Second, Mrs. A. D. Wood	3 00
HERBACEOUS PLANTS. — Jacob W. Manning	4 00

Gratuities : —

William C. Strong, Irises	$2 00
Newton Cemetery, "	2 00
Edwin Sheppard & Son, Irises and Hollyhocks	2 00
Dr. C. G. Weld, Hollyhocks, etc.	2 00
Charles F. Curtis, "	1 00
Joseph S. Fay, "	1 00
John L. Gardner, Gloxinias	2 00
" " *Dendrochilum filiforme*	2 00
John Irving, Candytuft	1 00
Joseph H. Woodford, Two vases of flowers	2 00
Mrs. P. D. Richards, Wild Flowers	2 00
Walter E. Coburn, " "	1 00
E. H. Hitchings, " "	1 00

JULY 19.

HOLLYHOCKS. — Double, twelve blooms of twelve distinct colors, in the Society's flat fruit dishes, Joseph S. Fay	4 00
Second, Edwin Sheppard & Son	3 00
Six blooms, of six distinct colors, Joseph S. Fay	2 00
Second, Nathaniel T. Kidder	1 00
PARLOR BOUQUET. — Mrs. E. M. Gill	4 00
Second, Mrs. A. D. Wood	3 00
Third, Joseph H. Woodford	2 00

Gratuities : —

Edwin Sheppard & Son, Display of Hollyhocks	2 00
Charles F. Curtis, " "	2 00
Mrs. Francis B. Hayes, Display of Flowers	3 00
Dr. C. G. Weld, " "	2 00
Frederick S. Davis, Poppies	1 00
Walter E. Coburn, Native Plants and Pelargoniums	1 00
Mrs. P. D. Richards, " "	1 00

JULY 26.

Special Prize, offered by M. B. Faxon.

SWEET PEAS. — For the best Bouquet or Vase, and best arranged, other foliage than that of Sweet Peas admissible, Mrs. Francis B. Hayes	3 00

Regular Prizes.

GLOXINIAS. — Display of Cut Flowers, John L. Gardner	4 00
Second, Dr. C. G. Weld	3 00
HYDRANGEAS. — Pair, in tubs or pots, Nathaniel T. Kidder	8 00
Second, Dr. C. G. Weld	6 00
Single plant, in tub or pot, Dr. C. G. Weld	5 00
Second, Nathaniel T. Kidder	3 00

NATIVE FERNS. — Best display, Mrs. P. D. Richards . . . $4 00
Second, Walter E. Coburn 3 00

Gratuities: —

Jackson Dawson, *Habenaria ciliaris* and *Epidendrum odora* . . 2 00
Joseph S. Fay, Collection of Hollyhocks 1 00
Mrs. Francis B. Hayes, Cut Flowers 2 00
E. H. Hitchings, Ferns, etc. 2 00

AUGUST 2.

SWEET PEAS. — Display, filling thirty vases, James F. C. Hyde . 6 00
Second, H. A. Jones 4 00
Third, George S. Harwood 3 00
BASKET OF FLOWERS. — Mrs. A. D. Wood 4 00
Second, Mrs. Francis B. Hayes 3 00
Third, Mrs. E. M. Gill 2 00
HERBACEOUS PLANTS. — Jacob W. Manning 4 00

AUGUST 9.

PERENNIAL PHLOXES. — Collection of twenty spikes, Edwin Sheppard & Son 5 00
Ten distinct named varieties, Edwin Sheppard & Son . . . 4 00
VASE OF FLOWERS. — Mrs. E. M. Gill 4 00
Second, Mrs. A. D. Wood 3 00
NATIVE FLOWERS. — Collection, Mrs. P. D. Richards . . . 4 00
Second, Walter E. Coburn 3 00
Third, E. H. Hitchings 2 00

Gratuities: —

J. Warren Clark, Gladioli 3 00

AUGUST 16.

GLADIOLI. — Twenty named varieties in spikes, J. Warren Clark . 6 00
Ten named varieties, in spikes, J. Warren Clark 3 00
Six named varieties, in spikes, J. Warren Clark 2 00
Display of named and unnamed varieties, filling one hundred vases, J. Warren Clark 6 00
PHLOX DRUMMONDI. — Thirty vases, not less than six varieties, L. W. Goodell 4 00
Second, Dr. C. G. Weld 3 00

ANNUAL EXHIBITION OF PLANTS AND FLOWERS.

AUGUST 19, 20, 21, AND 22.

Special Prizes, offered by H. H. Hunnewell.

CONIFEROUS TREES NOT NATIVES OF NEW ENGLAND. — Display in pots or tubs, named, Temple & Beard $15 00
Second, Jacob W. Manning 10 00

Special Prize, offered by R. & J. Farquhar & Co., Boston.

ANNUALS. — Display, filling not less than one hundred vases, Mrs. E. M. Gill, a piece of plate, value $40 00

Special Prizes, from the Theodore Lyman Fund.

FLORAL DESIGN. — For the best, and best kept for three days, and prizes awarded the last day, O. A. Ruggles, the Lyman plate, value 35 00
Second, Galvin Brothers, the Lyman plate, value . . . 30 00
Third, James Comley, the Lyman plate, value 25 00

Special Prospective Prize, offered by M. B. Faxon, Boston.

SWEET PEAS. — For the best display, other foliage than that of Sweet Peas admissible, prize to be taken by the same person or firm twice in three consecutive years: first year, George S. Harwood, a silver vase, value 25 00

Special Prizes, offered by the Society of American Florists.

DECORATION OF MANTLEPIECE AND FIREPLACE. — For the best arranged, David Allan, a piece of plate, value 75 00
Second, William E. Doyle, a piece of plate, value . . . 50 00

Special Prizes, offered by Abram French & Co., Boston.

DINNER TABLE DECORATION. — For the best, of flowers, or plants and flowers, William E. Doyle, a piece of plate, value . . 60 00
Second, Galvin Brothers, a piece of plate, value . . . 40 00

Special Prizes, offered by "The American Florist," Chicago.

HARDY HERBACEOUS FLOWERS. — For the best collection, named, with foliage, from plants not having woody or shrubby stems, and from all hardy bulbs, filling one hundred vases, with not less than seventy-five varieties, Jacob W. Manning, a piece of plate, value 40 00
Second, Temple & Beard, a piece of plate, value . . . 30 00

Special Prizes, offered by Henry A. Dreer, Philadelphia.

GLOXINIAS. — For the best collection of the flowers, by Amateur Exhibitors, Dr. C. G. Weld, a piece of plate, value . . 15 00
Second, Hon. Robert C. Winthrop, a piece of plate, value . 10 00

Special Prizes, offered by the "American Agriculturist," New York.

ORNAMENTAL FOLIAGE. — For the best collection, from Hardy Trees and Shrubs, filling fifty vases, William C. Strong, books, value 12 00
Second, Temple & Beard, books, value 8 00

Special Prizes, offered by Benjamin Grey, Malden.

NYMPHÆAS AND OTHER AQUATIC PLANTS AND FLOWERS. — For the best display, L. W. Goodell, a piece of plate, value . . $25 00
Second, Fairman Rogers, Newport, R.I., a piece of plate, value 15 00

Special Prizes, offered by Siebrecht & Wadley, New York.

ORCHIDS. — For the best collection of plants in bloom, Frederick L. Ames, a piece of plate, value 25 00
Second, H. H. Hunnewell, a piece of plate, value . . . 15 00
Single plant, Frederick L. Ames, *Lælia crispa superba*, a piece of plate, value 15 00

Special Prizes, offered by John Gardiner & Co., Philadelphia.

GLADIOLI. — For the best collection, filling one hundred vases, J. Warren Clark, a piece of plate, value 25 00
Second, Dr. C. G. Weld, a piece of plate, value . . . 15 00

Special Prizes, offered by the Society.

PALMS. — Pair, in tubs not less than twenty-four inches in diameter, H. H. Hunnewell 15 00
Second, Joseph H. White 10 00
Pair, in tubs not less than twenty inches in diameter, Joseph H. White 12 00
Pair, in tubs not less than sixteen inches in diameter, Joseph H. White 10 00
Pair, in tubs not less than twelve inches in diameter, Frederick L. Ames 8 00
Second, Joseph H. White 5 00

Regular Prizes.

STOVE AND GREENHOUSE PLANTS. — Six distinct named varieties, two Crotons admissible, H. H. Hunnewell 30 00
Second, John L. Gardner 25 00
Third, Nathaniel T. Kidder 20 00
Single plant, for table decoration, dressed at the base, only one entry admissible, the second prize to Nathaniel T. Kidder . 8 00
Third, John L. Gardner 6 00
SPECIMEN FLOWERING PLANT. — Single named variety, Joseph H. White 8 00
Second, John L. Gardner 6 00
ORNAMENTAL LEAVED PLANTS. — Six named varieties not offered in the collection of greenhouse plants, Crotons and Dracænas not admissible, Nathaniel T. Kidder 20 00
Second, Joseph H. White 15 00

Single specimen, variegated, named, not offered in any collection, Frederick L. Ames	$6 00
Second, Nathaniel T. Kidder	5 00
Third, George A. Nickerson	4 00
CALADIUMS. — Six named varieties, H. H. Hunnewell	6 00
Second, Nathaniel T. Kidder	4 00
FERNS. — Six named varieties, no Adiantums admissible, Nathaniel T. Kidder	10 00
Second, Frederick L. Ames	8 00
Third, Dr. C. G. Weld	6 00
ADIANTUMS. — Five named varieties, Nathaniel T. Kidder	8 00
Second, Dr. C. G. Weld	5 00
TREE FERN. — Single specimen named, Dr. C. G. Weld	10 00
Second, Joseph H. White	8 00
LYCOPODS. — Four named varieties, Nathaniel T. Kidder	5 00
Second, Dr. C. G. Weld	4 00
DRACÆNAS. — Six named varieties, H. H. Hunnewell	8 00
Second, Nathaniel T. Kidder	6 00
CROTONS. — Six named varieties, in not less than twelve-inch pots, Nathaniel T. Kidder	10 00
Six in six-inch pots, Dr. C. G. Weld	6 00
Second, John L. Gardner	5 00
Third, George A. Nickerson	2 00
CYCAD. — Single plant, named, Joseph H. White	10 00
Second, Joseph H. White	8 00
NEPENTHES. — Three plants, named, Frederick L. Ames	6 00
Second, John L. Gardner	5 00
ORCHIDS. — Six plants, named varieties, in bloom, Frederick L. Ames	12 00
Second, John L. Gardner	10 00
Three plants, named varieties, in bloom, Frederick L. Ames	8 00
Single plant in bloom, Frederick L. Ames	4 00
Second, H. H. Hunnewell	3 00

Gratuities : —

Frank Becker, Display of Plants on the platform	25 00
William E. Doyle, " " " "	25 00
Thomas Clark, Plants	20 00
George McWilliam, Plants	15 00
Dr. C. G. Weld, Plants	10 00
George A. Nickerson, Plants	10 00
Botanic Garden, Cambridge, Plants	10 00
John L. Gardner, Stove and Greenhouse Plants	10 00
Robert C. Winthrop, Plants	5 00
David Allan, Anthuriums, etc.	5 00
John L. Gardner, Agapanthus and Hydrangeas	5 00
Joseph H. White, Monstera and other Plants	5 00

William Patterson, Caladiums, etc.	$2 00
Fisher Brothers, Ferns, etc.	2 00
Albert Scott, Begonias	2 00
Benjamin Grey, Nymphæas	20 00
E. D. Sturtevant, Bordentown, N.J., Nelumbiums	5 00
Chipman Brothers, Pink Pond Lilies	3 00
Denys Zirngiebel, Asters	10 00
Mrs. P. D. Richards, Native Flowers	2 00
Jacob W. Manning, Native Ferns	1 00

AUGUST 30.

Special Prize, offered by Marshall B. Faxon.

ASTERS. — For the best display of Cut Flowers, filling twenty-five of the Society's glass vases, Mrs. Mary T. Goddard	4 00

Regular Prizes.

ASTERS. — Truffaut's Pæony Flowered, thirty blooms, not less than twelve varieties, the second prize to Mrs. Mary T. Goddard	4 00
Third, William Patterson	3 00
Victoria Flowered, thirty blooms, not less than twelve varieties, Mrs. Francis B. Hayes	5 00
Second, William Patterson	4 00
LILIUM LANCIFOLIUM. — Collection, the second prize to Mrs. E. M. Gill	2 00
BASKET OF FLOWERS. — Mrs. A. D. Wood	4 00
Second, Mrs. E. M. Gill	3 00

SEPTEMBER 6.

Special Prize, offered by Marshall B. Faxon.

TROPÆOLUMS. — For the best display, filling twenty of the Society's glass vases, Dr. C. G. Weld	3 00

Regular Prizes.

DOUBLE ZINNIAS. — Twenty-five flowers, not less than six varieties, Frederick L. Davis	4 00
Second, Nellie B. Cook	3 00
Third, Mrs. Francis B. Hayes	2 00
DIANTHUS. — Collection of Annual and Biennial varieties, filling fifty bottles, L. W. Goodell	4 00
Third, Dr. C. G. Weld	2 00
HERBACEOUS PLANTS. — Jacob W. Manning	4 00
Gratuity: —	
Benjamin Grey, Nymphæas, etc.	3 00

CHRYSANTHEMUM SHOW.

NOVEMBER 11, 12, 13, AND 14.

Special Prizes, from the Josiah Bradlee Fund.

CHRYSANTHEMUMS. — Fifty blooms, S. J. Coleman, the Bradlee plate, value $30 00
Fifty blooms, viz., thirty Japanese, ten Chinese, and ten Anemone, Joseph H. White, the Bradlee plate, value 20 00

Special Prizes, offered by the Society.

BEST SEEDLING OF 1889. — The Second prize to S. J. Coleman, for Albert Henry 5 00
Third, Joseph H. White, for Mrs. J. H. White 4 00

Regular Prizes.

Display of twenty named plants, all classes, distinct varieties, Walter Hunnewell 60 00
Second, Nathaniel T. Kidder 50 00
Third, Mrs. Francis B. Hayes 40 00
Display of twelve named plants, all classes, distinct varieties, Mrs. Francis B. Hayes 40 00
Six Japanese, distinct named varieties, the second prize to Nathaniel T. Kidder 15 00
Third, Dr. C. G. Weld 10 00
Six plants, Large Flowered Chinese, in not over eight-inch pots, distinct varieties, bearing not more than four blooms each, the second prize to the Bussey Institution 8 00
Six Japanese, in not over eight-inch pots, distinct named varieties, bearing not more than four blooms each, Dr. C. G. Weld . 10 00
Second, the Bussey Institution 8 00
Specimen, Incurved, or Chinese, named variety, Dr. Henry P. Walcott 6 00
Second, Walter Hunnewell 5 00
Specimen Japanese, named variety, Walter Hunnewell . . 6 00
Second, Mrs. Francis B. Hayes 5 00
Third, Dr. Henry P. Walcott 4 00
Specimen Pompon, named variety, Dr. Henry P. Walcott . . 5 00
Second, Walter Hunnewell 4 00
Specimen Anemone, named variety, Nathaniel T. Kidder . . 6 00
Second, Walter Hunnewell 5 00
Specimen trained Standard, any class, named, Nathaniel T. Kidder 8 00
Second, Joseph H. White 6 00
Third, Nathaniel T. Kidder 5 00

Twelve cut blooms, Large Flowered, or Chinese, named, in vases, E. A. Wood	$10 00
Second, Richard T. Lombard	8 00
Third, Patrick Malley	4 00
Twelve cut blooms, Japanese, named, in vases, Joseph H. White,	10 00
Second, E. A. Wood	8 00
Third, Dr. C. G. Weld	4 00
Six cut blooms, Large Flowered, or Chinese, named, in vases, Joseph H. White	6 00
Second, the Bussey Institution	4 00
Third, Richard T. Lombard	2 00
Six cut blooms, Japanese, named, in vases, E. A. Wood	6 00
Second, Dr. C. G. Weld	4 00
Third, George B. Gill	2 00
Display of cut blooms, of all classes, filling fifty vases, Mrs. Francis B. Hayes	12 00
Second, Mrs. E. M. Gill	10 00
Third, Joseph H. White	8 00
Fourth, Mrs. A. D. Wood	6 00

Gratuities : —

Mrs. Francis B. Hayes, Display of Chrysanthemums in pots (thirty-five plants)	15 00
The Bussey Institution, " " " " "	10 00
William H. Elliott, " " " " "	5 00
Joseph S. Fay, " " " " "	3 00
Norris T. Comley, " " Seedling Chrysanthemums	4 00
Arend Brandt, Newport, R.I., Display of Seedling Chrysanthemums	2 00
Miss Jennie W. May, Chrysanthemums of Open Culture	2 00
George Hollis, Chrysanthemums in vases	2 00
Richard T. Lombard, " " "	2 00
George M. Anderson, " " "	2 00
Galvin Brothers, Display on the Platform, Lower Hall	25 00
William E. Doyle, " " " " Upper Hall	20 00
Norton Brothers, " of Plants and Flowers	6 00
Edward Butler, Orchid, *Stanhopea oculata*	5 00
C. V. Whitten, Tea Rose Mme. Hoste	1 00
Edmund M. Wood & Co., Five vases of Tea Roses	3 00
Azell C. Bowditch, Vase of La France Roses	1 00
Galvin Brothers, Display of Carnations	2 00
Mrs. Francis B. Hayes, Cut Flowers	3 00

SOCIETY'S GOLD MEDAL.

June 14. Mrs. Francis B. Hayes, Display of Rhododendrons and Azaleas, five hundred blooms, one hundred varieties.

SILVER APPLETON MEDALS.

Chrysanthemum Show, Nov. 11–14. Henry A. Gane, Superior Seedling Chrysanthemums.

December 31. Jacob W. Manning. Having taken all the First Prizes of the year for exhibits of Herbaceous Plants.

SOCIETY'S SILVER MEDALS.

May Exhibition, May 10. A. W. Spencer, Orchid, *Anguloa Clowesii*.

July 19. Joseph S. Fay, Display of Hollyhocks.

Annual Exhibition of Plants and Flowers, August 19–22. George A. Nickerson, Croton, Queen Victoria.

Annual Exhibition of Plants and Flowers, August 19–22. Robert Cameron, Collection of Cacti.

Annual Exhibition of Plants and Flowers, August 19–22. George McWilliam, Variegated Alocasias.

Annual Exhibition of Plants and Flowers, August 19–22. William R. Smith, Washington, D.C., Carnivorous Plants.

September 6. Pitcher & Manda, Short Hills, N.J., *Cypripedium Arnoldianum*, *C. Veitchii*, and *C. concolor*.

Chrysanthemum Show, November 11–13. Arthur H. Fewkes, Best Seedling Chrysanthemum of 1889.

" " " " T. D. Hatfield, Superior cultivation of the Chrysanthemum Mrs. Alpheus Hardy.

" " " " S. J. Coleman, superior cultivation of Chrysanthemums.

" " " " E. M. Wood & Co., New Rose, Waban.

" " " " Richard Gardner, Newport, R.I., New Seedling Calanthe, a cross between *C. vestita* and *C. vestita rubro-oculata*.

FIRST CLASS CERTIFICATES OF MERIT.

January 4. John L. Gardner, *Kalanchoe carnea*.

Spring Exhibition, March 26–28. Jackson Dawson, superior cultivation of *Cypripedium acaule*.

" " " " Ernest Asmus, West Hoboken, N.J., New Yellow Rose, Mme. Hoste.

April 12. Mrs. Francis B. Hayes, Seedling Rhododendron William Power Wilson, entered for Prospective Prize.

May Exhibition, May 10. Jacob W. Manning, *Spiræa astilboides.*
Rhododendron Show, June 7. John L. Gardner, *Utricularia nelumbifolia.*
" " " " Mrs. Francis B. Hayes, *Begonia præcox superba.*
July 19. William E. Endicott, Gladiolus President Carnot.
" 26. John L. Gardner, Gladiolus John Laing.
" " " " " " Lamartine.
August 9. William E. Endicott, Seedling Gladiolus, Kehydius.
" 30. Joseph T. Comley, Seedling Gladiolus, Eclaireus.
September 6. Botanic Garden, Cambridge, *Cereus triangularis.*
Chrysanthemum Show, November 11–13. George B. Gill, Chrysanthemum sport, Mrs. Dudley C. Hall.
" " " " John McGowan, Orange, N.J., White Carnation, Lizzie McGowan.

HONORABLE MENTION.

Rose Exhibition, June 24–25. R. & J. Farquhar, Annual Carnation.
July 26. J. Warren Clark, Seedling Gladioli.
September 6. Dr. C. G. Weld, *Cyrtanthus hybridus.*
" " Thomas Cox, Seedling Gladiolus.
" " Botanic Garden, Cambridge, Collection of Herbaceous Plants.
Chrysanthemum Show, November 11–13. T. H. Spaulding, Orange, N.J., Seedling Chrysanthemum, D. D. Farson.
" " " " John McGowan, Orange, N.J., Yellow Carnation, Louise Porsch.
" " " " Lathrop Wright, Carnation Helen Galvin.

REPORT

OF THE

COMMITTEE ON FRUITS,

FOR THE YEAR 1890.

By E. W. WOOD, Chairman.

The season opened favorably for the fruit crop, the vines, shrubs, and trees having suffered little or no injury during the winter; the mild weather in the early spring encouraged a strong, vigorous growth; the fruit buds on the peach trees had been less injured than for several years, and, it being the bearing year for the apple in this State, the prospect had seldom looked more favorable for an abundant fruit crop.

The apple trees bloomed profusely, and there was a full average bloom among the pears; but it was noticed after the blossoms had fallen that a comparatively small amount of fruit had set. In some places the apple showed little or no fruit at all. Among the pears some varieties seemed to be much more unfavorably affected than others. There was a full average crop of Bartletts and Seckels. It will be remembered that during the time the apple and pear trees were in bloom we had almost continuous cold storms, which would seem to be the only unusual atmospheric condition to affect unfavorably these two species of fruit.

Notwithstanding the partial failure of two of our most important fruits, our exhibits, taken as a whole, have seldom, if ever, been better than during the past year. They have been fully up to the average in quantity and superior in quality.

The Strawberry Show was more than usually successful; the competition was earnest and close, especially for the larger prizes. While several past favorites have disappeared from our tables, new varieties have taken their places, and the interest in seedlings and the practice of growing them are constantly increasing, and several promising new ones were shown at this exhibition. Messrs. Campbell & Gowing showed on June 21 a new seedling variety which very closely resembled the Jewell in size, form, and color; but they claimed that it is some ten days earlier, and that the berries shown were among the last picked from the vines, and they were unable to show any specimens at the Rose and Strawberry Exhibition on the 24th and 25th. Unless these were grown in an exceptionally warm situation this new variety bids fair to meet the demand of the market-growers, who have long felt the need of a large-sized, early variety, thus extending the season and furnishing what the trade demands — large-sized, handsome fruit. Benjamin M. Smith showed a seedling from Miner's Prolific, which he has named the Beverly, from the town where it originated. It resembled the parent very closely, but was somewhat larger in size, and, as grown by Mr. Smith, was a strong, vigorous plant, and very productive. Among the recently introduced varieties that seemed the most promising were the Jessie, Bubach, Louise, and Crawford.

There has been the usual quantity of summer fruits shown at the weekly exhibitions, and the quality has been above the average. The Currant has generally been a partial, and in some places a total, failure the past season, and those who were so fortunate as to have a crop, realized about double the usual prices for them. There were no new varieties of Raspberries or Blackberries shown, the Dorchester, as usual, carrying off most of the prizes for the latter. The fruit growers in this vicinity give less attention to these two species of fruit, in proportion to their merit, than to any others. Their liability to winter-killing, and the consequent failure of a crop, prevents their more general cultivation.

At the Plant and Flower Show held at Music Hall in August, prizes were awarded for fruit, amounting to one hundred and five dollars. This amount was not taken from the appropriation made by the Society, but was contributed by private individuals.

At the annual exhibition in September a most interesting and

instructive exhibit was made by the Horticultural Department of the Agricultural College at Amherst. Very careful experiments have been made there in the application, by spraying, of the so-called Bordeaux mixture to the grape vine, to prevent mildew. The application has been made where there were duplicate vines of the same variety growing side by side, upon one vine only, and where there was a single vine upon a portion of it, and branches of the vines, with fruit and foliage attached, were exhibited, showing a very marked improvement in both fruit and foliage where the mixture had been applied.

Another interesting feature of this exhibition was from Dr. Jabez Fisher, who showed sample bunches of Concord grapes, all from the same vine, one-half of which had been girdled. The berries from the girdled portion of the vine were about one-third larger than those from the part not girdled and fully ripe, while the fruit from the other portion of the vine was not even fully colored. There were also several bunches of Eaton and Worden from girdled vines showing the same result.

As we were to have only fruits and vegetables at the September exhibition, thus affording very much more space than has heretofore been thus occupied, the Committee decided to invite some of the largest dealers in preserved fruits to make an exhibit. Within the last few years the improvement in the methods of preserving fruits has been greater than in growing them, and the business has been very largely increased. It is estimated that within the circle limited by a radius of forty miles around the city of Rochester, N.Y., there have been some years in which more than six million bushels of apples have been evaporated.

Some fifteen years ago, when the export of green fruit was very considerably increased, leading horticulturists thought the question of how to dispose of an abundant crop was solved. But here we have in this limited area around Rochester a consumption of fruit larger than all the green fruit exported from the whole country.

The Royal Horticultural Society of London has recently held a four days' exhibition, confined entirely to preserved fruits. We found upon soliciting contributions in September, that it was the most unfavorable time in the year, as the dealers had on hand only the stock they had carried over, expecting to receive their new stock later in the season; but Messrs. S. S. Pierce & Co. and George

Johnson & Co. made very handsome displays, which proved of much interest to visitors. With more time and a more extended display of all kinds of canned and evaporated fruits, both growers and consumers would be equally interested.

The fruit exhibits on the first Saturdays of October and November, as heretofore, were much better in quality than at the Annual Exhibition. The fall and winter fruits were then in perfection. The show of apples at the last exhibition, considering the season, was remarkably good. Several plates of Northern Spy were shown which were superior to any previously exhibited within the remembrance of the Committee.

There have been more peaches shown this season than for several years, and a very large proportion of them were seedling varieties. Remarkably fine specimens of Crawford's Late, grown under glass, were exhibited by D. B. Fearing, Newport, R.I., some of them measuring twelve inches in circumference.

Plums have been shown in less quantity than previously, and there is little probability of any considerable increase until some effectual means have been discovered to prevent injury to the trees by the black wart.

The Committee have awarded in prizes and gratuities the sum of $1,617, leaving an unexpended balance of $83.

In closing their report the Committee feel that they can congratulate the growers upon the general results of the year's work. While there have been partial failures in some lines, the prices received through the season will make a full average showing on the right side of the balance-sheet.

E. W. Wood,
O. B. Hadwen,
C. F. Curtis,
Sam'l. Hartwell,
Warren Fenno,

Committee on Fruits.

PRIZES AND GRATUITIES AWARDED FOR FRUITS.

SPRING EXHIBITION.

MARCH 26, 27, AND 28.

WINTER APPLES. — Any variety, William T. Hall, Northern Spy, $3 00
Second, Warren S. Frost, Baldwin 2 00
WINTER PEARS. — C. A. Smith, Anjou 3 00
Second, Edwin A. Hall, Winter Nelis 2 00
STRAWBERRIES. — Cephas H. Brackett, Sharpless 3 00

Gratuity: —

Asa Clement, Apples 1 00

JUNE 7.

Gratuity: —

Winter Brothers, Foreign Grapes 2 00

JUNE 14.

Gratuities: —

Leonard W. Weston, Crescent Strawberries 1 00
William Doran & Son, Downing " 1 00

JUNE 21.

Gratuities: —

Charles N. Brackett, Strawberries 1 00
Charles E. Grant, " 1 00
Campbell & Gowing, Seedling Strawberries 1 00
William G. Prescott, " " 1 00

ROSE AND STRAWBERRY EXHIBITION.

JUNE 24 AND 25.

Special Prizes from the Theodore Lyman Fund.

STRAWBERRIES. — For the best four quarts of any variety, Samuel Barnard, Jewell, the Lyman Plate, value 20 00
Second, Varnum Frost, Belmont, the Lyman Plate, value . 16 00
Third, Artemas Frost, Belmont, the Lyman Plate, value . . 12 00

Special Prizes offered by the Society.

For the best two quarts of any variety, to be judged by points,

Winter Brothers, Henderson	$6 00
Second, Warren Heustis & Son, Bay State	5 00
Third, John B. Burgess, Burgess Seedling	4 00
Fourth, Isaac E. Coburn, Jessie	3 00

For the best exhibition of a Seedling Strawberry introduced within the last five years, Benjamin M. Smith, for the Beverly, Silver Medal.

Regular Prizes.

For the largest and best collection, not less than twenty baskets, of two quarts each, and not less than five varieties, Samuel Barnard	25 00
Ten baskets of one variety, two quarts each, Samuel Barnard, Jewell	15 00
Second, Varnum Frost, Belmont	10 00
Third, Warren Heustis & Son, Belmont	8 00
Five baskets of one variety, two quarts each, Isaac E. Coburn, Jessie	8 00
Second, Varnum Frost, Belmont	6 00
Third, William Doran & Son, Sharpless	5 00
Two quarts of Belmont, Varnum Frost	4 00
Second, George F. Wheeler	3 00
Third, Charles N. Brackett	2 00
Bidwell, Isaac E. Coburn	4 00
Second, Samuel Barnard	3 00
Champion, A. B. Howard	4 00
Second, Samuel Barnard	3 00
Third, George F. Wheeler	2 00
Charles Downing, Nathaniel T. Kidder	4 00
Second, Charles E. Grant	3 00
Third, William Doran & Son	2 00
Crescent, Leonard W. Weston	4 00
Second, Isaac E. Coburn	3 00
Cumberland, George F. Wheeler	4 00
Second, Nathaniel T. Kidder	3 00
Third, Winter Brothers	2 00
Jewell, Samuel Barnard	4 00
Second, Isaac E. Coburn	3 00
May King, Samuel Barnard	4 00
Second, Isaac E. Coburn	3 00
Third, George F. Wheeler	2 00
Miner's Prolific, Isaac E. Coburn	4 00
Second, George F. Wheeler	3 00
Third, Samuel Barnard	2 00
Sharpless, Samuel Barnard	4 00

Wilder, the second prize to Winter Brothers	$3 00
Two quarts of any other variety, Nathaniel T. Kidder, Jessie	4 00
Second, Samuel Barnard. Parry	3 00
Third, A. B. Howard, Jessie	2 00
Collection of not less than six varieties, one quart each, Samuel Barnard	8 00
Second, Nathaniel T. Kidder	6 00
One quart of any new variety, Charles N. Brackett, Louise	3 00
Second, Campbell & Gowing, Seedling	2 00
CHERRIES. — Two quarts of any variety, Oliver R. Robbins, Black Tartarian	4 00
Second, Edwin Hastings, Black Tartarian	3 00
FOREIGN GRAPES. — Two bunches of any variety, Joseph H. White, Black Hamburg	6 00
Second, Winter Brothers, Black Hamburg	4 00
FORCED PEACHES. — Six specimens of any variety, Winter Brothers, Waterloo	3 00
Second, Winter Brothers, Amsden	2 00
Gratuities: —	
George V. Fletcher, Strawberries	6 00
C. S. Pratt, "	4 00
Charles E. Grant, "	1 00
Samuel H. Warren, Crawford Strawberries	1 00
A. B. Howard, Seedling Strawberries	1 00
George Johnson & Co., Grapes on vine	2 00

JUNE 28.

Gratuities: —	
William Doran & Son, Sharpless Strawberries	1 00
E. W. Howe, Red and White Wood Strawberries	1 00
Charles N. Brackett, Cherries	1 00

JULY 5.

STRAWBERRIES. — One quart of any variety, Benjamin M. Smith, Beverly	3 00
Second, Charles E. Grant, Longfellow	2 00
CHERRIES. — Two quarts of Black Tartarian, Charles F. Curtis	3 00
Two quarts of Downer's Late, Charles F. Curtis	3 00
Two quarts of any other variety, John L. Bird, Napoleon Bigarreau	3 00
Second, Marshall W. Chadbourne, White Heart	2 00
Third, " " " Governor Wood	1 00

JULY 12.

CHERRIES. — Two quarts of Black Tartarian, Leverett M. Chase	3 00
Two quarts of Downer's Late, Charles N. Brackett	3 00

Two quarts of any other variety, Charles F. Curtis, Hyde's Black	$3 00
Second, Marshall W. Chadbourne, White Heart	2 00
Third, Leverett M. Chase, Seedling	1 00
RASPBERRIES. — Two quarts of any variety, Charles E. Grant, Cuthbert	3 00
Second, William Doran & Son, Highland Hardy	2 00
CURRANTS. — Two quarts of any Red variety, Benjamin G. Smith, Versaillaise	4 00
Second, Benjamin G. Smith, Fay's	3 00
Third, William Doran & Son, Versaillaise	2 00
Two quarts of any White variety, Benjamin G. Smith, Transparent	3 00
Second, Benjamin G. Smith, White Gondouin	2 00
Gratuities: —	
William G. Prescott, Golden Queen Raspberries	1 00
Joseph H. Woodford, Gooseberries	1 00
Winter Brothers, Grapes and Peaches	2 00

JULY 19.

RASPBERRIES. — Collection of not less than four varieties, two quarts each, William Doran & Son	4 00
Two quarts of any variety, Charles E. Grant, Cuthbert	3 00
Second, William Doran & Son, Red Antwerp	2 00
CURRANTS. — One quart of Versaillaise, William Doran & Son	2 00
Second, Benjamin G. Smith	1 00
One quart of any other Red variety, Benjamin M. Smith, Fay's Prolific	2 00
Second, Benjamin G. Smith, Fay's Prolific	1 00
One quart of any White variety, Benjamin G. Smith, Transparent	2 00
Second, Benjamin G. Smith, White Gondouin	1 00
Gratuities: —	
Charles N. Brackett, Cherries	1 00
Marshall W. Chadbourne, Cherries and Currants	1 00
Mrs. E. M. Gill, " " "	1 00
Joseph S. Chase, Gooseberries	1 00

JULY 26.

RASPBERRIES. — Two quarts of any variety, William Doran & Son, Red Antwerp	3 00
Second, Charles E. Grant, Cuthbert	2 00
CURRANTS. — One quart of any Red variety, Benjamin G. Smith, Versaillaise	3 00
Second, Benjamin G. Smith, Fay's Prolific	2 00
Third, Benjamin M. Smith, " "	1 00

One quart of any White variety, Benjamin G. Smith, Transparent	$2 00
Second, Winter Brothers, White Grape	1 00
BLACKBERRIES. — Two quarts of any variety, Nathaniel T. Kidder, Dorchester	3 00
Second, Marshall W. Chadbourne, Dorchester	2 00
GOOSEBERRIES. — Two quarts of any Native variety, Benjamin G. Smith, Smith's Improved	3 00
Second, Benjamin G. Smith, Downing	2 00
Third, Joseph S. Chase, Smith's Improved	1 00
Gratuities: —	
William Doran & Son, Raspberries	2 00
Charles S. Smith, Alexander Peaches	1 00
Winter Brothers, Hale's Early Peaches	1 00

AUGUST 2.

BLACKBERRIES. — Two quarts of any variety, Nathaniel T. Kidder, Dorchester	3 00
Second, Marshall W. Chadbourne	2 00
Third, S. M. Vose, Dorchester	1 00
GOOSEBERRIES. — Two quarts of Industry, Winter Brothers	2 00
Two quarts of any other foreign variety, Benjamin G. Smith, Bang-Up	2 00
Second, Mrs. E. M. Gill, Whitesmith	1 00
PEARS. — Summer Doyenne, Benjamin G. Smith	3 00
Second, Leverett M. Chase	2 00
Third F. W. Payne	1 00
Any other variety, Warren Fenno, Giffard	3 00
PEACHES. — Any variety, William P. Walker, Hale's Early	3 00
Second, John L. Bird, Hale's Early	2 00

AUGUST 9.

APPLES. — Early Harvest, Warren Fenno	2 00
Sweet Bough, Warren Heustis & Son	3 00
Second, William T. Hall	2 00
Third, George V. Fletcher	1 00
Any other variety, John L. Bird, Red Astrachan	3 00
Second, William T. Hall, " "	2 00
Third, Marshall W. Chadbourne, " "	1 00
PEARS. — Giffard, Charles N. Brackett	3 00
Second, Mrs. Mary Langmaid	2 00
Third, John L. Bird	1 00
Any other variety, Mrs. Mary Langmaid, Manning's Elizabeth	3 00
Second, Charles N. Brackett, Brandywine	2 00
Third, Charles N. Brackett, Jargonelle	1 00

Blackberries. — Two quarts of any variety, Nathaniel T. Kidder, Dorchester	$3 00
Second, Marshall W. Chadbourne, Dorchester	2 00
Peaches. — Any variety, Nathan D. Harrington, Seedling	3 00
Gratuities: —	
Joseph H. White, Peaches	2 00
Warren Fenno, Apricots	1 00

August 16.

Apples. — Oldenburg, Warren Fenno	3 00
Red Astrachan, C. C. Shaw	3 00
Second, William T. Hall	2 00
Third, John L. Bird	1 00
Pears. — Clapp's Favorite, Aaron S. McIntosh	3 00
Second, Leverett M. Chase	2 00
Third, E. J. Hewins	1 00
Manning's Elizabeth, Mrs. Mary Langmaid	2 00
Second, Frank Ware	1 00
Any other variety, J. M. Sweet, Tyson	2 00
Second, John L. Bird, "	1 00
Apricots. — Warren Fenno	3 00
Peaches. — Twelve specimens of out-door culture, of any variety, John D. Woodbury, Seedling	3 00
Second, Nathan D. Harrington, Crawford's Early	2 00
Third, Nathan D. Harrington, Seedling	1 00
Six specimens of cold-house or pot culture, Joseph H. White, Noblesse	3 00
Foreign Grapes. — Two bunches of any variety, Nathaniel T. Kidder, Black Hamburg	5 00
Second, Joseph H. White, Bowood Muscat	4 00
Gratuities: —	
Charles F. Curtis, Apples	1 00
Charles N. Brackett, Apples and Pears	1 00

August 30.

Apples. — Williams's Favorite, Reuben Handley	3 00
Second, C. C. Shaw	2 00
Third, Artemas Frost	1 00
Any other variety, Warren Fenno, Summer Pippin	3 00
Second Varnum Frost, Gravenstein	2 00
Third, Nathaniel T. Kidder, Porter	1 00
Pears. — Bartlett, Mrs. Mary Langmaid	3 00
Second, Varnum Frost	2 00
Third, Leverett M. Chase	1 00

Rostiezer, S. F. & F. L. Weston	$3 00
Second, Charles N. Brackett	2 00
Third, Marshall W. Chadbourne	1 00
Tyson, John L. Bird	3 00
Second, Aaron S. McIntosh	2 00
Third, Benjamin G. Smith	1 00
Any other variety, Aaron S. McIntosh, Clapp's Favorite	3 00
Second, Charles N. Brackett, Souvenir du Congrès	2 00
Third, E. J. Hewins, Clapp's Favorite	1 00
PEACHES. — Any variety, Nathan D. Harrington, Seedling	3 00
Second, Mrs. Mary Langmaid, Foster	2 00
Third, C. H. Johnson, Seedling	1 00
PLUMS. — Any variety, William H. Hunt, Bradshaw	3 00
Second, Leverett M. Chase	2 00
Third, Benjamin G. Smith, Imperial Gage	1 00
NATIVE GRAPES. — Any variety, Samuel Hartwell, Moore's Early	3 00
Second, Cephas H. Brackett, " "	2 00
Third, Benjamin G. Smith, Champion	1 00

SEPTEMBER 6.

APPLES. — Foundling, Reuben Handley	3 00
Gravenstein, Reuben Handley	3 00
Second, Warren Heustis & Son	2 00
Third, Artemas Frost	1 00
Maiden's Blush, Warren Fenno	3 00
Second, E. R. Cook	2 00
Porter, Reuben Handley	3 00
Second, E. R. Cook	2 00
Third, E. H. Thompson	1 00
Any other variety, Warren Fenno, Alexander	3 00
Second, E. R. Cook, Fall Orange or Holden	2 00
Third, Jesse F. Wheeler, Summer Pippin	1 00
PEARS. — Andrews, Mrs. Mary Langmaid	3 00
Second, Benjamin G. Smith	2 00
Third, Arthur Timmins	1 00
Boussock, Mrs. Mary Langmaid	3 00
Second, Charles F. Curtis	2 00
Third, Leverett M. Chase	1 00
Any other variety, Mrs. Mary Langmaid, Bartlett	3 00
Second, Charles N. Brackett, Bartlett	2 00
Third, Aaron S. McIntosh, "	1 00
PEACHES. — Collection, Charles S. Smith	4 00
Second, Nathan D. Harrington	3 00
Third, C. H. Johnson	2 00
PLUMS. — Bradshaw, Leverett M. Chase	2 00
Second, Benjamin G. Smith	1 00

Imperial Gage, Mrs. Mary Langmaid	$2 00
Second, William H. Hunt	1 00
Jefferson, William P. Walker	2 00
Lombard, William Christie	2 00
Second, Leverett M. Chase	1 00
Washington, J. W. Goodell	2 00
Any other variety, William H. Hunt, Pond's Seedling	2 00
Second, Charles F. Curtis, Seedling	1 00
NATIVE GRAPES. — Six bunches of Cottage, William H. Hunt	3 00
Second, Benjamin G. Smith	2 00
Moore's Early, Samuel Hartwell	3 00
Second, William H. Hunt	2 00
Any other variety, William H. Hunt, August Rose	3 00
Second, Benjamin G. Smith, Lady	2 00
Gratuity: —	
Robert Manning, Figs	1 00

ANNUAL EXHIBITION.

SEPTEMBER 17 AND 18.

SPECIAL PRIZES.

Samuel Appleton Fund.

BALDWIN APPLES. — Best twelve, William C. Eustis	5 00
HUBBARDSTON APPLES. — Best twelve, Samuel Hartwell	5 00
BOSC PEARS. — Best twelve, John L. Bird	5 00
SHELDON PEARS. — Best twelve, Mrs. Mary Langmaid	5 00

Benjamin V. French Fund.

GRAVENSTEIN APPLES. — Best twelve, Jabez Fisher	5 00
RHODE ISLAND GREENING APPLES. — Best twelve, Jabez Fisher	5 00

Marshall P. Wilder Fund.

ANJOU PEARS. — Best twelve, Mrs. Mary Langmaid	4 00
Second, Samuel G. Damon	3 00
Third, Cephas H. Brackett	2 00
Fourth, Leverett M. Chase	1 00
BARTLETT PEARS. — Best twelve, Mrs. Mary Langmaid	4 00
Second, Frank Ware	3 00
Third, C. H. Johnson	2 00
Fourth, Varnum Frost	1 00
CONCORD GRAPES. — Best six bunches, Arthur J. Bigelow	3 00
Second, William H. Hunt	2 00
Third, William Doran & Son	1 00
MOORE'S EARLY GRAPES. — Best six bunches, Samuel Hartwell	3 00
Second, E. A. Hubbard	2 00
Third, John B. Moore & Son	1 00

Theodore Lyman Fund.

FOREIGN BLACK GRAPES. — Heaviest and best ripened bunch, not less than six pounds, George McWilliam $10 00

FOREIGN WHITE GRAPES. — Heaviest and best ripened bunch, not less than six pounds, George McWilliam 10 00

Special Prizes offered by the Society.

ANJOU PEARS. — Best twelve, Mrs. Mary Langmaid . . . 5 00

BARTLETT PEARS. — Best twelve, Mrs. Mary Langmaid . . 5 00

NATIVE GRAPES. — Best twelve bunches of any variety, Arthur J. Bigelow, Concord 5 00

Theodore Lyman Fund.

APPLES. — Baldwin, E. R. Cook 4 00
Second, Reuben Handley 3 00
Third, Warren Heustis & Son 2 00
Danvers Sweet, Warren Fenno 3 00
Second, S. P. Buxton 2 00
Third, C. C. Shaw 1 00
Dutch Codlin, James H. Clapp 2 00
Second, T. N. Russell 1 00
Fall Orange, Reuben Handley 3 00
Second, E. R. Cook 2 00
Third, Asa Clement 1 00
Fameuse, Benjamin G. Smith 3 00
Second, George V. Fletcher 2 00
Third, Marshall W. Chadbourne 1 00
Fletcher Russet, John Fletcher 3 00
Foundling, Asa Clement 4 00
Second, Reuben Handley 3 00
Garden Royal, Oliver B. Wyman 3 00
Second, Reuben Handley 2 00
Golden Russet, Warren Fenno 2 00
Gravenstein, Reuben Handley 4 00
Second, Warren Heustis & Son 3 00
Third, J. H. Butterfield 2 00
Hubbardston, Reuben Handley 4 00
Second, William H. Hunt 3 00
Third, Jabez Fisher 2 00
Hunt Russet, William H. Hunt 3 00
Second, Samuel Hartwell 2 00
Third, Calvin Terry 1 00
Lady's Sweet, David L. Fisk 2 00
Second, Asa Clement 1 00
Lyscom, Asa Clement 2 00
Maiden's Blush, Jabez Fisher 2 00
Second, C. C. Shaw 1 00

Mother, Benjamin G. Smith,	$3 00
Second, James H. Clapp	2 00
Third, E. W. Wood	1 00
Northern Spy, George V. Fletcher	3 00
Second, William T. Hall	2 00
Third, William C. Eustis	1 00
Porter, Aaron S. McIntosh	3 00
Second, E. R. Cook	2 00
Third, Reuben Handley	1 00
Pumpkin Sweet, David L. Fisk	2 00
Rhode Island Greening, Nathaniel T. Kidder	4 00
Second, Reuben Handley	3 00
Third, Charles E. Grant	2 00
Roxbury Russet, E. R. Cook	4 00
Second, John L. Bird	3 00
Third, Warren Heustis & Son	2 00
Tolman's Sweet, Artemas Frost	3 00
Second, David L. Fisk	2 00
Third, Asa Clement	1 00
Tompkins King, Jabez Fisher	3 00
Second, Judson Hartshorn	2 00
Third, Herbert Wilkinson	1 00
Washington Royal, Charles N. Brackett	3 00
Washington Strawberry, Warren Fenno	2 00
Any other variety, Warren Fenno, Alexander	3 00
Second, William T. Hall	2 00
Third, Samuel Hartwell, Gloria Mundi	1 00
CRAB APPLES. — Hyslop, Marshall W. Chadbourne	2 00
Second, C. C. Shaw	1 00

Society's Prizes.

PEARS. — Angouleme, Mrs. Mary Langmaid	4 00
Second, A. H. Lewis	3 00
Third, Samuel G. Damon	2 00
Belle Lucrative, Mrs. Mary Langmaid	3 00
Second, Leverett M. Chase	2 00
Third, Warren Heustis & Son	1 00
Bosc, J. M. Sweet	4 00
Second, Charles F. Curtis	3 00
Third, John L. Bird	2 00
Fourth, Mrs. Mary Langmaid	1 00
Boussock, Leverett M. Chase	3 00
Second, Arthur Timmins	2 00
Third, George W. Eaton	1 00
Clairgeau, Mrs. Mary Langmaid	3 00
Second, William T. Hall	2 00
Third, Charles F. Curtis	1 00

Comice, Charles N. Brackett	$3 00
Second, William P. Walker	2 00
Third, Warren Fenno	1 00
Dana's Hovey, E. W. Wood	4 00
Second, Samuel G. Damon	3 00
Third, David L. Fisk	2 00
Diel, William P. Walker	3 00
Second, Charles A. Smith	2 00
Third, Edwin A. Hall	1 00
Hardy, Aaron S. McIntosh	3 00
Second, J. M. Sweet	2 00
Third, Arthur Timmins	1 00
Howell, Leverett M. Chase	3 00
Second, Benjamin G. Smith	2 00
Third, Mrs. Mary Langmaid	1 00
Lawrence, John McClure	3 00
Second, Samuel Hartwell	2 00
Third, Mrs. Mary Langmaid	1 00
Louise Bonne of Jersey, Arthur Timmins	3 00
Second, Leverett M. Chase	2 00
Third, Thomas M. Davis	1 00
Marie Louise, Warren Fenno	3 00
Second, Samuel G. Damon	2 00
Third, Edwin A. Hall	1 00
Merriam, Samuel G. Damon	3 00
Second, Charles F. Curtis	2 00
Third, Aaron S. McIntosh	1 00
Onondaga, Leverett M. Chase	3 00
Second, Charles A. Smith	2 00
Third, Arthur Timmins	1 00
Paradise of Autumn, Leverett M. Chase	3 00
Second, William H. Hunt	2 00
Third, Warren Fenno	1 00
Seckel, William Doran & Son	4 00
Second, Thomas M. Davis	3 00
Third, Leverett M. Chase	2 00
Sheldon, Nathan D. Harrington	4 00
Second, Arthur Timmins	3 00
Third, Leonard W. Weston	2 00
Souvenir du Congrès, Benjamin H. Ober	3 00
Second, J. M. Wetherbee	2 00
Third, Charles N. Brackett	1 00
St. Michael Archangel, Warren Heustis & Son	3 00
Second, Thomas M. Davis	2 00
Third, Benjamin G. Smith	1 00
Superfin, Leverett M. Chase	3 00
Second, Samuel G. Damon	2 00
Third, Thomas M. Davis	1 00

Urbaniste, Aaron S. McIntosh	$3 00
Second, Marshall W. Chadbourne	2 00
Third, John L. Bird	1 00
Vicar, Leverett M. Chase	3 00
Second, Charles A. Smith	2 00
Third, Edwin A. Hall	1 00
Winter Nelis, Thomas M. Davis	3 00
Second, Edwin A. Hall	2 00
Third, William P. Walker	1 00
Any other variety, Warren Heustis & Son, Bonne d'Ezée	3 00
Second, Frederick R. Shattuck, De Tongres	2 00
Third, Warren Fenno, Adams	1 00
QUINCES. — Any variety, Benjamin G. Smith, Rea	3 00
Second, George S. Curtis, Rea	2 00
Third, George V. Fletcher, Orange	1 00
PEACHES. — Coolidge's Favorite, the second prize to Charles S. Smith	2 00
Crawford's Early, William H. Hunt	3 00
Second, G. W. Goddard	2 00
Third, George W. Stevens	1 00
Foster, David L. Fisk	3 00
Second, John L. Bird	2 00
Oldmixon, Charles S. Smith	3 00
Third, W. A. Bemis	1 00
Stump the World, Charles S. Smith	3 00
Any other variety, W. D. Kelly	3 00
Second, G. W. Goddard	2 00
Third, G. W. Goddard	1 00
PEACHES, ORCHARD HOUSE CULTURE. — Charles E. Grant	4 00
Second, Joseph H. White	3 00
PLUMS. — Lombard, Leverett M. Chase	2 00
Second, G. W. Goddard	1 00
Any other variety, Mrs. Mary Langmaid	2 00
Second, Benjamin G. Smith	1 00
NATIVE GRAPES. — Brighton, Samuel Hartwell	3 00
Second, Joseph S. Chase	2 00
Third, Marshall W. Chadbourne	1 00
Cottage, William H. Hunt	3 00
Second, Samuel G. Damon	2 00
Third, Benjamin H. Ober	1 00
Delaware, Joseph S. Chase	3 00
Second, Samuel G. Damon	2 00
Third, E. R. Cook	1 00
Eumelan, Benjamin G. Smith	3 00
Massasoit, Benjamin G. Smith	3 00
Second, Joseph S. Chase	2 00

Niagara, Samuel Hartwell	$3 00
Second, E. A. Hubbard	2 00
Third, P. G. Hanson	1 00
Wilder, Benjamin G. Smith	3 00
Second, Samuel G. Damon	2 00
Worden, F. J. Kinney	3 00
Second, Samuel Hartwell	2 00
Third, E. R. Cook	1 00
Any other variety, William H. Hunt, August Rose	3 00
Second, John B. Moore & Son, Moore's early	2 00
Third, John B. Moore & Son, Hayes	1 00
Foreign Grapes. — Four varieties, two bunches each, George McWilliam	10 00
Second, E. W. Wood	8 00
Third, Benjamin G. Smith	6 00
Black Hamburg, two bunches, Nathaniel T. Kidder	5 00
Second, George McWilliam	4 00
Third, Joseph H. White	3 00
Buckland Sweetwater, Nathaniel T. Kidder	5 00
Muscat of Alexandria, George McWilliam	5 00
Second, Joseph H. White	4 00
Wilmot's Hamburg, Nathaniel T. Kidder	5 00
Second, George McWilliam	4 00
Third, E. W. Wood	3 00
Any other variety, George McWilliam	5 00
Second, George McWilliam	4 00
Third, E. A. Hubbard	3 00
Gratuities : —	
Edward B. Wilder, Pears	3 00
Winn, Ricker, & Co., Peaches	2 00
Caleb Bates, Figs	1 00
Nathan D. Harrington, Seedling Peaches	1 00
C. H. Johnson, Seedling Peaches	1 00
Massachusetts Agricultural College, Collection of Apples, Pears, and Peaches	10 00
Massachusetts Agricultural College, Educational display of Grapes with foliage	Silver Medal
Robert McLeod, Newport, R.I., Peaches	Silver Medal
S. S. Pierce & Co., Display of Preserved Fruits and Vegetables	Silver Medal
George Johnson & Co., Display of Preserved and Fresh Fruits and Vegetables	Silver Medal

EXHIBITION OF AUTUMN FRUITS.

OCTOBER 4.

APPLES. — Gravenstein, Reuben Handley	$3 00
Second, Benjamin A. Moore	2 00
Third, William T. Hall	1 00
Fall Orange, or Holden, Reuben Handley	3 00
Second, Asa Clement	2 00
Mother, Asa Clement	3 00
Second, Benjamin G. Smith	2 00
Porter, Aaron S. McIntosh	3 00
Second, E. J. Hewins	2 00
Any other variety, Nathaniel T. Kidder, Rhode Island Greening	3 00
Second, Benjamin G. Smith, Fameuse	2 00
PEARS. — Angouleme, L. A. Milman	3 00
Second, William S. Janvrin	2 00
Third, John McClure	1 00
Bosc, John L. Bird	3 00
Second, William P. Walker	2 00
Third, Mrs. Mary Langmaid	1 00
Clairgeau, William T. Hall	3 00
Second, Mrs. Mary Langmaid	2 00
Third, Willard P. Plimpton	1 00
Comice, William S. Janvrin	3 00
Second, Leverett M. Chase	2 00
Third, William P. Walker	1 00
Louise Bonne of Jersey, Thomas M. Davis	3 00
Second, Leverett M. Chase	2 00
Third, Arthur Timmins	1 00
Seckel, Arthur Timmins	3 00
Second, E. A. Hubbard	2 00
Third, William Doran & Son	1 00
Sheldon, George W. Wilkinson	3 00
Second, John L. Bird	2 00
Third, George E. Freeman	1 00
Superfin, Michael Finnegan	3 00
Second, Leverett M. Chase	2 00
Third, Samuel G. Damon	1 00
Urbaniste, A. D. Miller	3 00
Second, John L. Bird	2 00
Third, John K. Berry	1 00
Any other variety, Walter Russell, Howell	3 00
Second, Warren Fenno, Marie Louise	2 00
Third, Warren Heustis & Son, St. Michael Archangel	1 00
QUINCES. — Any variety, Benjamin G. Smith	3 00
Second, Charles S. Smith	2 00
Third, Joseph S. Chase	1 00

Peaches. — Any variety, William H. Hunt, Crawford's Late	$3 00
Second, Nathan D. Harrington, Seedling	2 00
Third, Charles E. Grant, Lemon	1 00
Native Grapes. — Brighton, Benjamin G. Smith	3 00
Second, T. H. Talbot	2 00
Third, Samuel G. Damon	1 00
Concord, Arthur J. Bigelow	3 00
Second, C. F. Hayward	2 00
Third, E. A. Hubbard	1 00
Delaware, C. F. Hayward	3 00
Second, Joseph S. Chase	2 00
Third, Samuel G. Damon	1 00
Iona, Samuel G. Damon	3 00
Second, Henry W. Wilson	2 00
Third, Benjamin G. Smith	1 00
Isabella, Samuel G. Stone	3 00
Lindley, Benjamin G. Smith	3 00
Second, Joseph S. Chase	2 00
Massasoit, Benjamin G. Smith	3 00
Moore's Early, E. A. Hubbard	3 00
Pocklington, Samuel Hartwell	3 00
Second, George W. Jameson	2 00
Third, Samuel G. Damon	1 00
Prentiss, Benjamin G. Smith	3 00
Second, Joseph S. Chase	2 00
Third, Samuel G. Damon	1 00
Wilder, Benjamin G. Smith	3 00
Second, Samuel G. Damon	2 00
Any other variety, Benjamin G. Smith, Barry	3 00
Second, C. F. Hayward, Niagara	2 00
Third, Benjamin G. Smith, Jefferson	1 00
Foreign Grapes. — Two bunches of any variety, Nathaniel T. Kidder, Black Hamburg	4 00

EXHIBITION OF WINTER FRUITS.

November 8.

Special Prizes, Benjamin V. French Fund.

Baldwin Apples. — Best twelve, John L. Bird	5 00
Hubbardston Apples. — Best twelve, Reuben Handley	5 00

Society's Prizes.

Apples. — Baldwin, Nathaniel T. Kidder	3 00
Second, S. M. Vose	2 00
Third, George B. Gill	1 00

Danvers Sweet, Warren Fenno	$3 00
Second, Benjamin P. Ware	2 00
Hubbardston, Walter Russell	3 00
Second, Reuben Handley	2 00
Third, Marshall W. Chadbourne	1 00
Hunt Russet, William H. Hunt	3 00
Second, Benjamin G. Smith	2 00
Third, Samuel Hartwell	1 00
Lady's Sweet, Asa Clement	3 00
Northern Spy, Nathaniel T. Kidder	3 00
Second, William T. Hall	2 00
Third, Mrs. Alfred E. Giles	1 00
Rhode Island Greening, Nathaniel T. Kidder	3 00
Second, Joseph Lovell	2 00
Third, Willard P. Plimpton	1 00
Roxbury Russet, Cephas H. Brackett	3 00
Second, J. Warren Clark	2 00
Third, S. M. Vose	1 00
Tolman's Sweet, Artemas Frost	3 00
Second, Willard P. Plimpton	2 00
Third, Asa Clement	1 00
Tompkins King, John Parker	3 00
Second, Warren Fenno	2 00
Any other variety, Aaron S. McIntosh, Yellow Bellflower	3 00
Second, John R. Brewer, Murphy	2 00
Third, Samuel Hartwell, Gloria Mundi	1 00
PEARS. — Angouleme, John L. Bird	4 00
Second, William S. Janvrin	3 00
Third, A. H. Lewis	2 00
Fourth, Arthur Timmins	1 00
Anjou, Arthur Timmins	4 00
Second, Warren Fenno	3 00
Third, George W. Hall	2 00
Fourth, Aaron S. McIntosh	1 00
Clairgeau, William T. Hall	3 00
Second, Warren Fenno	2 00
Third, Arthur Timmins	1 00
Comice, William S. Janvrin	4 00
Second, John J. Merrill	3 00
Third, Leverett M. Chase	2 00
Fourth, John L. Bird	1 00
Dana's Hovey, Willard P. Plimpton	4 00
Second, Benjamin G. Smith	3 00
Third, E. W. Wood	2 00
Fourth, Warren Fenno	1 00
Glout Morceau, Edwin A. Hall	3 00

Josephine of Malines, Warren Fenno	$3 00
Second, Benjamin G. Smith	2 00
Third, John L. Bird	1 00
Diel, Edwin A. Hall	3 00
Second, William P. Walker	2 00
Third, Thomas M. Davis	1 00
Langelier, John L. Bird	3 00
Second, Thomas M. Davis	2 00
Third, A. H. Lewis	1 00
Lawrence, John McClure	3 00
Second, Warren Fenno	2 00
Third, William T. Hall	1 00
Vicar, J. M. Sweet	3 00
Second, Aaron S. McIntosh	2 00
Third, Leverett M. Chase	1 00
Winter Nelis, Mrs. Fanny Browning	3 00
Second, Thomas M. Davis	2 00
Third, Edwin A. Hall	1 00
Any other variety, Aaron S. McIntosh, Urbaniste	3 00
Second, William P. Walker, Bosc	2 00
Third, John J. Merrill	1 00
FOREIGN GRAPES. — Two bunches of any variety, Fisher Brothers, Alicante	5 00
Second, E. A. Hubbard, Gros Colman	4 00
Third, E. A. Hubbard, Muscat	3 00

REPORT

OF THE

COMMITTEE ON VEGETABLES,

FOR THE YEAR 1890.

By CHARLES N. BRACKETT, Chairman.

In every human life — one may almost say in every human undertaking — there must come times devoted to what, in commercial phrase, is called "taking account of stock." At such times, the life or the undertaking finds itself almost, as it would seem, involuntarily at a pause, and, like the mercantile world, it closes its doors for a longer or a shorter period to outside interests, and reviews its past failures and successes, settles their causes to its own satisfaction, and, casting aside what have proved to be impediments, prepares itself for a new and wiser start in its chosen direction. Such a time as this seems just at present to have come to us. The eve of a new year is proverbially the time for a critical survey of the past, and the making of good resolutions for the future.

The attendance at our weekly exhibitions has been good during the year, with increasing interest on the part of members, and a better appreciation of the work of the Society by the public in general. The Annual and other great exhibitions of the year were largely attended and very successful, except when interrupted by stormy weather. The interest shown by the public in these exhibitions has been of the most encouraging kind, giving evidence of the constantly increasing taste and love for Horticulture, and showing that the work of the Society in promoting the interests and objects for which it was established has pervaded the community in its influence.

A new departure at the Annual Exhibition this year was the separation of the Plant and Flower Show from that of the Fruit and Vegetables. By this arrangement the Fruit and Vegetable departments at the Annual Show were left with both the halls of the Society to fill. Some fears were entertained that we should not be able to occupy so much space without the assistance of the Flower Department, but the result proved that such fears were unfounded. The display of vegetables completely filled the lower hall, and taken as a whole, was one of the best exhibitions which this department has ever made. We were indebted to the Boston Public Institutions at Long Island and the Boston Asylum and Farm School for large and interesting collections at this exhibition.

The show of forced vegetables, January 4, was not as large as it should have been, only about half the prizes on the Schedule being competed for. The specimens of varieties shown, however, were fully up to the average.

The season for out-door vegetables was opened, May 10, with Asparagus, Edmund Hersey taking first prize with some very fine specimens, and Leonard W. Weston the first prize at the following show. The ravages of the Asparagus Beetle are now much complained of, and threaten the destruction of this valuable crop, unless some remedy is soon found for this pest. Several among our contributors are largely engaged in the culture of asparagus, having acres devoted to its production, and the loss of this crop would be a serious one to them. A liberal application of air-slacked lime, sown broadcast just as the shoots are about to make their appearance, and repeated if necessary, has been recommended and tried with success by one of our contributors. The remedy is simple and cheap, if effectual. Rusts, blights, and mildews are also subtle enemies of our fruit and vegetable crops, and how to overcome or avoid them cannot be known until we have learned more about them. A wide field is opened up to our scientists, who are at present devoting considerable attention to this subject, and it is hoped they may find the causes of these dreaded foes and remedies to counteract them.

The show of vegetables, August 20, was the largest and decidedly the best of all the weekly exhibitions during the season. The prizes were all competed for, and all but one were awarded. At this exhibition, Joseph S. Fay exhibited fine specimens of his

new Hybrid Melon, — Fay's Triumph, — weighing from eleven and one-half to fourteen pounds each. This melon is a cross between the Irondequoit and Christiana, and of fine flavor. Mr. Fay also showed extra fine specimens of Surprise, Christiana, Emerald Gem, and Hackensack melons, besides a general display of melons, consisting of twenty-one specimens, making the largest and best collection of green and salmon flesh melons ever shown in the Hall by a single exhibitor. Mr. Fay has been a large contributor at our weekly exhibitions all through the season, and his exhibits have attracted particular attention on account of their excellence.

Among the novelties in the way of new vegetables introduced the past season may be mentioned Burpee's Dwarf Lima Bean, exhibited here for the first time August 30, by C. E. Grant. This new bean should not be confounded with Henderson's Bush Lima (noticed in our last report), which is a small bean, belonging to the Carolina or Sieva class. Burpee's Bush Lima is a perfect bush bean with pods and beans as large as those of the well-known Large Lima Pole bean. The plants grow from eighteen to twenty-two inches in height, with a strong and branching main stem and thick leathery foliage, indicating a strong constitution. Each plant will produce under ordinary field culture from twenty-five to fifty pods, each pod containing three or four beans; generally three. In field culture of the Pole Lima, the cost of poles and the labor of setting them adds considerably to the expense of the crop, while in gardens they are anything but ornamental. With the introduction of this new bean we now have both the Large and Small Lima in bush form, which can be grown with no more trouble or expense than common bush beans. We consider this bean a great acquisition, and have no doubt it will soon become a popular variety with market gardeners.

At the Annual Exhibition, in September, the show of vegetables was large and fine — a credit to any State or society. Market gardening, as carried on around Boston, is probably not excelled in any other locality in the country. In Arlington, Belmont, and other suburban towns, large areas are devoted to vegetable houses, where all through the winter and early spring may be seen immense quantities of finely grown vegetables under glass. There are also, among these market-gardeners, specialists, who devote their whole attention to the growing of either Celery,

Cauliflowers, Squashes, or some other single crop, which they grow to perfection, and derive large profits therefrom. These and kindred crops must be well grown to command good prices; for unless of good quality they can hardly be sold at any price. These establishments not only supply our own market with their produce, but also ship large quantities to New York and elsewhere.

The Cauliflowers shown by W. H. Teele, Egg Plant by E. J. Coolidge, and Watermelons by C. E. Grant, at the Annual Exhibition, are deserving of special mention, as the specimens of each were remarkably fine and well grown. No competitors appeared for the regular prizes for Boston Market Celery at the Annual Exhibition. The first Special Prize for Celery was awarded to Artemas Frost for Golden Self-Blanching, I. E. Coburn taking the second with White Plume.

November 8, a new Seedling Potato was exhibited by E. L. Coy, of New York, its originator, who has sent out many good varieties, such as Beauty of Hebron, Empire State, Puritan, and others, which have a wide and well-established reputation. This new seedling is of good form and size; both skin and flesh are white, texture mealy, and flavor delicate. Specimens were furnished the committee for trial, and all who have reported agree as to its superior quality. A First Class Certificate of Merit was awarded to Mr. Coy. We have been informed since this potato was on exhibition here that it has been named the Vaughan, and will probably be for sale under that name the coming season.

We have to record the great loss which this department has sustained during the past year in the death of Mr. George Hill, one of our largest and most valued contributors, who for thirteen years was a member of this Committee. We can also recall the names of many other active and constant contributors who have passed away within a few years, — Hatch, Pierce, Fillebrown, Crosby, Hill, — all of whom served the Society faithfully and well for many years, as members of the Vegetable Committee, and contributed largely to the success of our exhibitions. But while we mourn the loss of these tried friends, we also regret that we do not see more of our young and enthusiastic cultivators coming forward to fill the gaps thus made in our ranks. The fact is obvious, that the horticulturists of today must, in the ordinary course of nature, soon give place to younger men, and it is equally true that if we scan the ranks of Horticulture today, these coming

men fail to materialize in adequate numbers, so that it seems necessary, if not even indispensable, that the rising generation should, in some manner, be led to take a stronger interest in the work which this Society is doing. The question seems to be, How can this be best accomplished? The indications are that the problem is not easy of solution.

A few brief weeks ago the various committees were all hard at work making preparations for the Annual, and closing exhibitions of the year. Now these exhibitions have passed into history, with all that pertains to them: their successes, their failures, the hard labor required, and their undeniable marks of solid progress. The record of these exhibitions forms a chapter of more or less interest in the story of the year's work; an eloquent commentary upon the men and women who helped make the record. And as the years succeed each other in their rapid flight, as the annals accumulate and become venerable from dust and old age, who can turn back volume after volume, without wishing that the beginning of his own life's story had been more earnest, and that the chapters toward the end of it had been richer in results achieved?

The annual appropriation for this department was $1,000. Of this amount the Committee have awarded $914 in prizes and gratuities, leaving an unexpended balance of $86.

With the annexed list of awards, this report is respectfully submitted.

C. N. Brackett,
Chairman.

PRIZES AND GRATUITIES AWARDED FOR VEGETABLES.

January 4.

Radishes. — Four bunches, George F. Stone	$3 00
Second, George F. Stone, White Tip	2 00
Cucumbers. — Pair of any variety, Richard T. Lombard	3 00
Cauliflowers. — Four specimens, George E. Sanderson	3 00
Lettuce. — Four heads of Tennisball, second prize, George F. Stone,	2 00
Parsley. — Two quarts, George F. Stone	3 00
Second, George E. Sanderson	2 00
Mushrooms. — Twenty-four specimens, Cephas H. Brackett	3 00
Tomatoes. — Twelve specimens, Winter Brothers, Essex	3 00
Second, Cephas H. Brackett, Champion	2 00
Third, Cephas H. Brackett, Essex	1 00
Gratuity : —	
Cephas H. Brackett, Asparagus	2 00

February 1.

Radishes. — Four bunches of any variety, George F. Stone	3 00
Lettuce. — Four heads, the second prize to George F. Stone	2 00
Mushrooms. — Twenty-four specimens, Cephas H. Brackett	3 00
Second, Oak Grove Farm	2 00
Rhubarb. — Twelve stalks, George E. Sanderson, Victoria	3 00
Second, George E. Sanderson, Monarch	2 00
Tomatoes. — Twelve, Charles Winter	3 00
Second, Cephas H. Brackett	2 00
Third, Winter Brothers	1 00
Gratuities : —	
George E. Sanderson, Collection	2 00
Mrs. Francis B. Hayes, Cress	1 00
George F. Stone, Parsley	1 00

February 15.

Gratuity : —	
George F. Stone, Collection	2 00

SPRING EXHIBITION.

MARCH 26, 27, and 28.

William J. Walker Fund.

RADISHES. — Four bunches of Turnip Rooted, George F. Stone . $3 00
Four bunches of Long Scarlet, Charles A. Learned . . . 3 00
CUCUMBERS. — Pair of White Spine, William Nicholson . . 3 00
DANDELIONS. — Peck, Edwin J. Coolidge 3 00
LETTUCE. — Four heads, George F. Stone 3 00
Second, John L. Gardner 2 00
Third, Charles A. Learned 1 00
PARSLEY. — Two quarts, John L. Gardner 2 00
Second, George F. Stone 1 00
RHUBARB. — Twelve stalks, George E. Sanderson 3 00

Gratuities : —

Edward J. Coolidge, Collection 3 00
Thomas Clark, Mushrooms 2 00
Thomas Rowland, " 1 00

APRIL 19.

Gratuity : —

Ernest E. Moore, Lettuce 1 00

MAY EXHIBITION.

MAY 10.

William J. Walker Fund.

ASPARAGUS. — Four bunches, Edmund Hersey 3 00
Second, Varnum Frost 2 00
Third, Leonard W. Weston 1 00
CUCUMBERS. — Pair of White Spine, Varnum Frost . . . 3 00
Second, Charles A. Learned 2 00
SPINACH. — Peck, Warren Heustis & Son 3 00
DANDELIONS. — Peck, Warren Heustis & Son 2 00
LETTUCE. — Four heads, M. E. Moore 3 00
Second, George F. Stone 2 00
RHUBARB. — Twelve stalks, George E. Sanderson 3 00
Second, Marshall W. Chadbourne 2 00
Third, Warren Heustis & Son 1 00

Gratuities : —

Mrs. Francis B. Hayes, Potatoes and Radishes 2 00
George F. Stone, Collection 1 00

MAY 24.

Gratuity : —

Mrs. Francis B. Hayes, Potatoes $1 00

MAY 31.

Gratuities : —

Joseph S. Fay, Collection 2 00
C. W. Prescott, Asparagus 1 00

RHODODENDRON SHOW.

JUNE 7.

Theodore Lyman Fund.

BEETS. — Twelve specimens, Warren S. Frost 3 00
Second, Joseph S. Fay 2 00
CARROTS. — Twelve short scarlet, Joseph S. Fay. 3 00
RADISHES. — Four bunches turnip rooted, Warren Heustis & Son . 3 00
Second, Marshall W. Chadbourne 2 00
ASPARAGUS. — Four bunches, Leonard W. Weston 3 00
Second, C. W. Prescott 2 00
Third, Charles E. Grant 1 00
CUCUMBERS. — Pair, Varnum Frost 3 00
Second, Warren S. Frost 2 00
LETTUCE. — Four heads, Varnum Frost 3 00
Second, Warren S. Frost 2 00
Third, Warren Heustis & Son 1 00
RHUBARB. — Twelve stalks, Cephas H. Brackett (35 pounds) . . 3 00
Second, Benjamin G. Smith (24 pounds) 2 00
Third, Marshall W. Chadbourne 1 00

Gratuities : —

Joseph S. Fay, Cauliflowers and Onions 3 00
Warren Heustis & Son, Onions and Lettuce 2 00
Winter Brothers, three varieties of Tomatoes 3 00
Mrs. E. M. Gill, Tomatoes 1 00

JUNE 14.

Gratuities : —

Charles E. Grant, Alaska Peas 1 00
John B. Moore & Son, White Spine Cucumbers 1 00

JUNE 21.

Gratuities : —

Charles E. Grant, Peas 1 00
Samuel Hartwell, " 1 00

ROSE AND STRAWBERRY EXHIBITION.

JUNE 24 AND 25.

BEETS. — Twelve Summer Turnip Rooted, Charles A. Learned	$3 00
Second, Varnum Frost	2 00
Third, Warren Heustis & Son	1 00
ONIONS. — Twelve specimens, Joseph S. Fay	3 00
Second, Charles A. Learned	2 00
Third, Warren Heustis & Son	1 00
CUCUMBERS. — Pair of White Spine, Varnum Frost	3 00
Second, Warren S. Frost	2 00
Third, Artemas Frost	1 00
CABBAGES. — Three of any variety, Charles A. Learned, Henderson,	3 00
Second, Charles A. Learned, Wakefield	2 00
Third, Warren Heustis & Son	1 00
LETTUCE. — Four heads of any variety, Charles A. Learned	3 00
Second, George F. Stone	2 00
Third, Warren Heustis & Son	1 00
PEAS. — Half-peck of any variety, Cephas H. Brackett, American Wonder	3 00
Second, Joseph S. Fay, Maud S.	2 00
Third, " " " Alaska	1 00

Gratuities : —

Winter Brothers, Tomatoes	2 00
Samuel Hartwell, Clipper Peas	1 00
Cephas H. Brackett, Hebron Potatoes	1 00
Joseph S. Fay, Potatoes and Carrots	1 00
Warren Heustis & Son, Radishes	1 00
Charles A. Learned, Collection	3 00

JUNE 28.

Gratuity : —

Charles N. Brackett, American Wonder Peas	1 00

JULY 5.

ONIONS. — Twelve specimens, Joseph S. Fay	2 00
Second, Charles A. Learned	1 00
CABBAGES. — Three of any variety, Charles A. Learned, Henderson,	3 00
Second, Charles A. Learned, Wakefield	2 00
PEAS. — Half-peck of American Wonder, Calvin Terry	3 00
Second, Charles E. Grant	2 00
Any other variety, John L. Gardner, Prodigy	3 00
Second, Nathaniel T. Kidder, Advancer	2 00

Gratuity : —

Charles A. Learned, Egyptian Beets	1 00

JULY 12.

POTATOES. — Twelve specimens, Joseph S. Fay, Hebron	$3 00
Second, Calvin Terry, Rose	2 00
Third, Charles E. Grant, Rose	1 00
SQUASHES. — Four Long Warted, Warren Heustis & Son	2 00
BEANS. — Half-peck of String of any variety, Isaac E. Coburn	3 00
Second, Joseph S. Fay	2 00
Third, George F. Stone	1 00
PEAS. — Half-peck of any variety, George S. Harwood, Duchess	3 00
Second, Charles N. Brackett, Stratagem	2 00
Third, Isaac E. Coburn, "	1 00

Gratuities: —

Winter Brothers, Tomatoes	1 00
Charles F. Curtis, Collection of Beans, nine varieties	3 00
Warren Heustis & Son, Collection	3 00
George F. Stone, "	2 00

JULY 19.

Levi Whitcomb Prizes.

CABBAGES. — Three Drumhead, Joseph S. Fay	3 00
Second, Warren Heustis & Son	2 00
BEANS. — Half-peck of Cranberry, Isaac E. Coburn	3 00
PEAS. — Half-peck of any variety, Charles N. Brackett, Stratagem,	3 00
Second, Isaac E. Coburn, Stratagem	2 00
Third, George S. Harwood, "	1 00
SWEET CORN. — Twelve ears, Joseph S. Fay	3 00
Second, Nathaniel T. Kidder	2 00
Third, Charles E. Grant	1 00
TOMATOES. — Open culture, twelve specimens, Nathaniel T. Kidder,	3 00

Gratuities:

Charles B. Lancaster, Potatoes	1 00
Charles N. Brackett, "	1 00

JULY 26.

POTATOES. — Twelve specimens, Joseph S. Fay, Charles Downing	3 00
Second, Joseph S. Fay, Hebron	2 00
Third, Charles B. Lancaster, Hebron	1 00
SWEET CORN. — Twelve ears, Joseph S. Fay, Corey	3 00
Second, John L. Gardner, Burbank	2 00
Third, Joseph S. Fay, Crosby	1 00
TOMATOES. — Open culture, twelve specimens, Varnum Frost, Paragon	3 00
Second, Varnum Frost, Emery	2 00

Gratuities : —

Charles N. Brackett, Collection	$2 00
Charles E. Grant, Beans and Potatoes	1 00
John L. Gardner, Nutting Beet	1 00

AUGUST 2.

POTATOES. — Any variety, twelve specimens, Joseph S. Fay, Savoy,	3 00
Second, John B. Moore & Son, Hebron	2 00
Third, Joseph S. Fay, Charles Downing	1 00
SQUASHES. — Three Marrow, Edward J. Coolidge	3 00
Second, Warren Heustis & Son	2 00
PEAS. — Half-peck of any variety, Charles N. Brackett, Stratagem,	3 00
Second, Charles E. Grant, Profusion	2 00
Third, Charles E. Grant, Yorkshire Hero	1 00
SWEET CORN. — Twelve ears, Joseph S. Fay, Perry's Hybrid	3 00
Second, Joseph S. Fay, Crosby	2 00
Third, Nathaniel T. Kidder, Crosby	1 00
TOMATOES. — Twelve specimens, Varnum Frost, Emery	3 00
Second, Varnum Frost, Paragon	2 00
Third, Nathaniel T. Kidder, Edgar's Seedling	1 00

Gratuities : —

Calvin Terry, Corn and Potatoes	1 00
Charles B. Lancaster, Potatoes	1 00
John B. Moore & Son, Cucumbers	1 00
John L. Gardner, Cabbages	1 00
Nathaniel T. Kidder, Collection of Tomatoes	2 00
Charles E. Grant, Collection	2 00

AUGUST 9.

BEANS. — Two quarts of Goddard, Warren Heustis & Son	3 00
Second, George F. Stone	2 00
Third, Oliver R. Robbins	1 00
TOMATOES. — Twelve specimens of Acme, Charles N. Brackett	3 00
Second, George F. Stone	2 00
Emery, C. N. Brackett	3 00
Second, Varnum Frost	2 00
Third, Edward J. Coolidge	1 00
Any other variety, Nathaniel T. Kidder, Perfection	3 00
Second, Varnum Frost, Perfection	2 00
Third, George F. Stone, "	1 00
EGG PLANT. — Four Round Purple, Edward J. Coolidge	3 00

Gratuities : —

Joseph H. Woodford, Beans	1 00
Calvin Terry, Corn	1 00

Charles N. Brackett, Corn and Peas	$1 00
George F. Stone, Parsley and Cucumbers	1 00
Charles E. Grant, Collection	2 00

AUGUST 16.

GREENFLESH MELONS. — Four specimens, Varnum Frost	3 00
SALMON-FLESH MELONS. — Four specimens, Warren Heustis & Son,	3 00
SWEET CORN. — Twelve ears, Charles N. Brackett, Excelsior	3 00
Second, Varnum Frost, Crosby	2 00
Third, C. N. Brackett, "	1 00
EGG PLANT. — Four Round Purple, Edward J. Coolidge	2 00
Second, Joseph S. Fay	1 00

Gratuities: —

Charles N. Brackett, Tomatoes and Peppers	2 00
W. F. Reynolds, Celery	2 00
Charles E. Grant, Collection	2 00

AUGUST 30.

POTATOES. — Twelve specimens of any variety, J. S. Fay, Hebron	3 00
Second, Joseph S. Fay, Rose	2 00
Third, Charles E. Grant	1 00
ONIONS. — Twelve specimens, Varnum Frost	3 00
Second, Joseph S. Fay	2 00
Third, Artemas Frost	1 00
GREENFLESH MELONS. — Four specimens, Varnum Frost	3 00
Second, Joseph S. Fay	2 00
Third, Samuel Hartwell	1 00
SALMON-FLESH MELONS. — Any variety, four specimens, Warren Heustis & Son, Emerald Gem	3 00
Second, Joseph S. Fay, Christiana	2 00
Third, " " " Surprise	1 00
WATERMELONS. — Pair, Charles E. Grant, Black Spanish	3 00
Third, Charles E. Grant, Fordhook	1 00
BEANS. — Two quarts of Large Lima, Warren S. Frost	3 00
Second, Varnum Frost	2 00
Third, Benjamin G. Smith	1 00
Two quarts of Dwarf Lima, Nathaniel T. Kidder	3 00
Second, Joseph S. Fay	2 00
Third, Charles E. Grant	1 00
Two quarts of Goddard, shelled, Isaac E. Coburn	3 00
Second, N. T. Kidder	2 00
Third, William Christie	1 00
SWEET CORN. — Twelve ears of Potter's Excelsior, Charles N. Brackett	3 00
Second, William Christie	2 00
Third, Charles E. Grant	1 00

Any other variety, William H. Hunt, Burr's $3 00
Second, Joseph S. Fay, Stowell's 2 00
Third, Samuel Hartwell, Crosby 1 00
Peppers. — Twelve specimens of Squash, C. N. Brackett . . 3 00
Second, George W. Jameson 2 00
Third, Richard T. Lombard 1 00
Any other variety, Richard T. Lombard, Bull Nose . . . 3 00
Second, Joseph S. Fay 2 00
Third, Charles F. Curtis 1 00

Gratuities: —

Charles N. Brackett, Tomatoes, four varieties 2 00
William H. Teel, Cauliflowers 2 00
Samuel Hartwell, Cabbages 2 00
Joseph S. Fay, Egg Plant. 1 00
Charles E. Grant, Collection 3 00
George F. Stone, " 1 00

September 6.

Cauliflowers. — Four, William H. Teel 3 00
Second, A. M. Knowlton 2 00
Celery. — Four roots, L. W. Platts, White Plume 3 00
Beans. — Two quarts of Large Lima, Varnum Frost . . . 3 00
Second, Warren S. Frost 2 00
Peppers. — Twelve Squash, Charles N. Brackett 3 00
Second, George W. Jameson 2 00
Third, George A. Lovell 1 00
Any other variety, George A. Lovell, Bull Nose 3 00
Second, C. N. Brackett, Ruby King 2 00

Gratuities: —

Charles E. Grant, Collection 3 00
Charles N. Brackett, " 3 00
Isaac E. Coburn, " 2 00

ANNUAL EXHIBITION.

September 17 and 18.

Special Prizes.

Cauliflowers. — Best four specimens, William H. Teel . . 5 00
Celery. — Best four specimens, Artemas Frost 8 00
Second, Isaac E. Coburn 6 00

Regular Prizes.

Beets. — Twelve Turnip Rooted, Varnum Frost 3 00
Second, John L. Gardner 2 00
Third, George F. Stone 1 00

Carrots. — Twelve Long Orange, Joseph S. Fay	$3 00
Twelve Intermediate, F. J. Kinney	3 00
Second, Samuel Walker	2 00
Third, J. S. Fay	1 00
Parsnips. — Twelve Long, Samuel Walker	3 00
Second, Warren Heustis & Son	2 00
Third, Charles A. Learned	1 00
Potatoes. — Four varieties, twelve specimens each, Charles B. Lancaster	5 00
Second, F. J. Kinney	4 00
Third, William Christie	3 00
Clark, Twelve specimens, F. J. Kinney	3 00
Second, William Christie	2 00
Third, James J. H. Gregory	1 00
Hebron, William G. Prescott	3 00
Second, S. A. Merrill	2 00
Third, Charles N. Brackett	1 00
Rose, S. A. Merrill	3 00
Second, F. J. Kinney	2 00
Third, Calvin Terry	1 00
Savoy, F. J. Kinney	3 00
Second, Isaac E. Coburn	2 00
Any other variety, Albert Bresee, Leader	3 00
Second, F. J. Kinney, Essex	2 00
Third, F. J. Kinney, Burbank	1 00
Salsify. — Twelve specimens, John L. Gardner	3 00
Second, F. J. Kinney	2 00
Third, Warren Heustis & Son	1 00
Turnips. — Twelve Flat, F. J. Kinney	2 00
Second, George F. Stone	1 00
Swedish, Joseph S. Fay	2 00
Second, William Christie	1 00
Onions. — Twelve Danvers, George F. Stone	3 00
Second, Charles A. Learned	2 00
Third, Varnum Frost	1 00
Portugal, Joseph S. Fay	3 00
Red, " " "	3 00
Second, James J. H. Gregory	2 00
Third, John L. Gardner	1 00
Greenflesh Melons. — Four, Samuel Hartwell	3 00
Second, Charles F. Curtis	2 00
Third, Charles E. Grant	1 00
Watermelons. — Pair, Charles E. Grant, Black Spanish	3 00
Second, Charles E. Grant, Fordhook	2 00
Third, Charles E. Grant, Gold and Green	1 00
Squashes. — Three Hubbard, Joseph S. Fay	3 00
Second, Charles A. Learned	2 00
Third, S. P. Buxton	1 00

Hybrid Turban, S. P. Buxton	$3 00
Second, Charles A. Learned	2 00
Marblehead, C. A. Learned	3 00
Second, F. J. Kinney	2 00
Marrow, Varnum Frost	3 00
Second, F. J. Kinney	2 00
Third, Warren S. Frost	1 00
Turban, P. G. Hanson	3 00
Second, F. J. Kinney	2 00
CABBAGE. — Drumhead, Joseph S. Fay, Marblehead	3 00
Second, Oliver R. Robbins, Brunswick	2 00
Third, J. S. Fay, All Seasons	1 00
Red, Samuel Hartwell	3 00
Second, S. P. Buxton	2 00
Third, William Christie	1 00
Savoy, Joseph S. Fay	3 00
Second, Samuel Hartwell	2 00
Third, William Christie	1 00
CAULIFLOWERS. — Four specimens, William H. Teel	3 00
CELERY. — Four roots, Artemas Frost, Golden	5 00
Second, F. J. Kinney	4 00
Third, Isaac E. Coburn, White Plume	3 00
ENDIVE. — Four specimens, F. J. Kinney	3 00
HORSERADISH. — Six roots, F. J. Kinney	3 00
Second, Charles A. Learned	2 00
BEANS. — Large Lima, two quarts, Varnum Frost	3 00
Second, Warren S. Frost	2 00
Third, Mrs. E. M. Gill	1 00
CORN. — Sweet, twelve ears, S. A. Merrill, Burr's	3 00
Second, P. G. Hanson, Stowell's	2 00
Third, Charles N. Brackett, Ruby King	1 00
Yellow or Field, twenty-five ears, William Christie	3 00
EGG PLANT. — Four Round Purple, Edward J. Coolidge	3 00
Second, Warren Heustis & Son	2 00
Third, Joseph S. Fay	1 00
TOMATOES. — Three varieties, twelve specimens each, Charles N. Brackett	5 00
Second, Varnum Frost	4 00
Third, Isaac E. Coburn	3 00
Acme, William Christie	3 00
Second, C. N. Brackett	2 00
Third, Charles E. Grant	1 00
Emery, Charles N. Brackett	3 00
Second, Varnum Frost	2 00
Third, Isaac E. Coburn	1 00
Paragon, C. N. Brackett	3 00
Second, Varnum Frost	2 00
Third, George Sanderson	1 00

Cardinal, Charles N. Brackett	$3 00
Second, Varnum Frost	2 00
Third, Charles E. Grant	1 00
Any other variety, Isaac E. Coburn, Ignotum	3 00
Second, Charles N. Brackett, "	2 00
Third, George E. Sanderson, Red Cross	1 00
PEPPERS. — Twelve Squash, Charles N. Brackett	3 00
Second, George W. Jameson	2 00
Third, William Christie	1 00
Any other variety, Richard T. Lombard, Bull Nose	3 00
Second, Charles N. Brackett, Ruby King	2 00

Gratuities: —

Mrs. Francis B. Hayes, Sea Kale	2 00
William C. Strong, Sweet Potatoes	1 00
S. A. Merrill, Squashes	1 00
Charles A. Learned, Bay State Squashes	1 00
Edward J. Coolidge, Egg Plant	1 00
James J. H. Gregory, Collection of Potatoes	3 00
Boston Public Institutions, Long Island, Collection	6 00
Boston Asylum and Farm School, "	5 00
G. W. Goddard, "	10 00
George Johnson & Co., "	5 00
Charles A. Learned, "	3 00
John L. Gardner, "	3 00
George F. Stone, "	2 00
Charles E. Grant, "	2 00
William Christie, "	1 00

EXHIBITION OF AUTUMN FRUITS AND VEGETABLES.

OCTOBER 4.

SALSIFY. — Twelve specimens, Walter Russell	3 00
Second, Warren Heustis & Son	2 00
Third, George W. Jameson	1 00
SQUASHES. — Three Hubbard, Charles A. Learned	3 00
Second, S. P. Buxton	2 00
Marrow, Varnum Frost	3 00
Second, S. P. Buxton	2 00
CABBAGES. — Three Drumhead, S. P. Buxton	3 00
Second, Oliver R. Robbins	2 00
Third, George F. Stone	1 00
Red, S. P. Buxton	3 00
Second, Samuel Hartwell	2 00
Third, Charles N. Brackett	1 00

Savoy, S. P. Buxton	$3 00
Second, Samuel Hartwell	2 00
Third, Charles B. Lancaster	1 00
Cauliflowers. — Four specimens, William H. Teel	3 00
Celery. — Four roots, Artemas Frost, Golden	4 00
Second, Isaac E. Coburn, White Plume	3 00
Third, Charles A. Learned, Arlington	2 00

Gratuities :—

Mrs. E. M. Gill, Tomatoes	1 00
Calvin Terry, Peppers	1 00
C. A. Learned, Collection	4 00
George W. Jameson, Collection	2 00
Charles E. Grant, "	2 00
Charles N. Brackett, "	2 00

EXHIBITION OF WINTER FRUITS AND VEGETABLES.

November 8.

Cucumbers. — Pair, the third prize to Varnum Frost	1 00
Cabbages. — Three Red, S. P. Buxton	3 00
Second, H. A. Bagley	2 00
Third, Charles B. Lancaster	1 00
Savoy, William Christie	3 00
Second, H. A. Bagley	2 00
Third, S. P. Buxton	1 00
Brussels Sprouts. — Half-peck, Joseph H. White	3 00
Second, William Christie	2 00
Cauliflowers. — Four specimens, William H. Teel	3 00
Celery. — Four roots, Artemas Frost	3 00
Second, Walter Russell	2 00
Lettuce. — Four heads, the third prize to George F. Stone	1 00
Tomatoes. — Twelve specimens, Winter Brothers	3 00

Gratuities : —

Calvin Terry, Turnips	1 00
Edward L. Coy, New York, New Seedling Potato Vaughan	1 00
William S. Janvrin, Tomatoes	1 00
Walter Russell, Collection	2 00

FIRST CLASS CERTIFICATES OF MERIT.

March 26. Benjamin K. Bliss, for new Squash Pride of the Amazon.
August 2. Joseph Tailby, for Hybrid Cucumber.
August 16. Charles N. Brackett, for Ignotum Tomatoes.
August 30. Charles E. Grant, for Burpee's Bush Lima Beans.
November 8. Edward L. Coy, New York, for New Seedling Potato, Vaughan.

REPORT

OF THE

COMMITTEE ON GARDENS,

FOR THE YEAR 1890.

By JOHN G. BARKER, Chairman.

We again bring to the Society the report of our doings for the past year. The applications for the various premiums have been much less in number than we could have hoped. For years there have been none for the H. H. Hunnewell Triennial Premiums. Whether there is a lack of interest on the part of those who own places of the size prescribed, or whether three consecutive years is too long a term to require a place to be kept in order, for the amount offered, is more than we can tell, but this much we can safely venture to suggest, that we should encourage as far as possible not only the judicious laying out of small places, but a more general desire to learn how to plant and maintain them in the most economical manner. Our suburbs are fast filling up with such places. Larger estates, with an abundance of glass-houses, and everything on an extensive scale which wealth only can obtain, are the exception and not the rule. When we look back and think of the many interesting and well-kept places that once existed near Boston, but are now no more, we deeply regret the change.

In too many instances a lack of interest is the reason why these grand old places are entirely obliterated; unlike the custom in Old England, these estates are not handed down from one generation to another. But not unfrequently the march of progress brings the railroad, and the well-kept garden must yield to the public needs and the demands of the real-estate man; and where

once the fruit and kitchen gardens were seen, the trees laden with luscious fruits, the vegetables in greatest abundance, the flower-garden and pleasure-grounds the admiration of the passer-by and the attraction of the many — now the new street is found, and modern flats or cottage residences occupy the place of the once well-kept gardens. Then the indefatigable, persistent, tree-agent comes along and with his chromos bewitches the occupant or owner of the place, who is induced to make a liberal investment, being led to anticipate most flattering results, but who is too often doomed to bitter disappointment. His trees and shrubs are delivered half dried up; some scarcely live, more die altogether. Although disappointed it may be that he tries again, but, succeeding no better, gives it up, and future years find these small places overgrown with weeds, and utterly neglected.

This is not an imaginary idea expressed for the sake of making a report to you; it is unfortunately true, and we deem it a subject worthy of our best thought, and we ask if we have not some work to do to produce a change for the better in this direction. Surely the voice of the Society should be made louder and be heard farther than it is on this and many other kindred subjects. Unless we are aroused from the too evident conservatism which seems to be fast taking possession of us in the work of the Society, instead of a State Society we shall soon be merely a city and suburban society — and the suburb a small one at that.

Progress has been made in some directions during the past year, which is very gratifying indeed; but when we consider that out of a total appropriation of $6,000, the Garden Committee was allotted for Flower Gardens, Greenhouses, Strawberry Gardens, and Vineyards, the sum of $300 only — and part of that from the John A. Lowell Fund, which the Society is bound to offer — is it to be wondered at that there is no more competition for the meagre prizes we are enabled to offer? A well-kept Flower Garden, a house of Orchids, a Market or Amateur Strawberry Garden, or a Vineyard of one acre, requires time and money to establish and maintain. Let us look at some of the prizes offered, in comparison with those in other departments. These are for 1891: For the best arranged and best kept Flower Garden, — hardy perennial and biennial plants admissible, — $50; best Six Greenhouse and Stove plants, $30. For the best arranged and best kept Stove or Greenhouse, during the month of March or April,

$60. At the Spring Exhibition in March: Six Azaleas, $20; one Stove or Greenhouse plant in bloom, $8. At the Rose Show, two Stove and Greenhouse Flowering plants, $15. For the best Market Strawberry Garden, $50. For the best Amateur Strawberry Garden, $30. At the Strawberry Show: For the best four quarts of any variety, from the Lyman Fund, $20. For the best Vineyard of one acre, $50. At the Annual Exhibition: For the best six bunches of native Grapes in all cases, $3. Now, how does this look? Ten Greenhouse and Stove plants would equal a whole Flower Garden. So far as regards the amount of the prize offered, eighteen Azaleas would equal the best arranged and best kept Stove and Greenhouse with plants. Ten of the best quarts of Strawberries would equal an entire Market Garden, and six quarts would equal the Amateur. One hundred bunches of Grapes would equal the Vineyard of an acre. These are facts. We beg your careful consideration of these comparisons of prizes, and we ask for your suggestions after giving it. If we, as a Society, are doing all we can, and the sum allotted to this Committee is sufficient, then there is nothing to be said, and we have only to keep along in the well-worn rut; if not yet doing our best, let us get out of this rut, — and the sooner the better, — and let us wake up thoroughly to the real merits of the case, and in future strive to work justly and to the full measure of our ability and opportunities for usefulness.

The President in his annual address very properly alluded to the meeting of the Society of American Florists held in Boston last season. This event occupied a great deal of the time of the active members of the Society, and at a season of the year when this Committee usually make their visits to the vineyards. This and the meeting of the Association of American Cemetery Superintendents kept us all busy, especially your Chairman, with the last-named society. It may not be out of place to say that this Association is only four years old, and if it is small in number — only a trifle over one hundred active members — it represents the whole country, and delegates were present from most of the leading cemeteries in the United States; and among the eight honorary members, is one at Aarhuus, Denmark. The members have already realized the great benefit of united effort, and the meetings that have been held were of inestimable value to all, but especially to those who are located at a

distance from the large cities. Not one of the members from other States had ever witnessed such an exhibition as that at Music Hall, and many of them were so delighted that they said that alone paid them for coming to Boston, while the visits to Mount Auburn, Newton, and Forest Hills cemeteries, as well as to the Arnold Arboretum and Franklin Park, were not only interesting but very profitable, especially that to the Arboretum; and as the Horticultural Society is the originator of the Suburban Cemetery, you will doubtless be gratified to learn the progress of this youthful organization. Its first meeting was held at Cincinnati; the second at Brooklyn; the third at Detroit; the fourth at Boston; and the fifth will be at Chicago. Thus you see the places of meeting have been in cities where we could not only meet and listen to a superintendent of large experience, but could see his work, and that is what determines his rank in the profession. As the plans of the Society for the future are developed and extended, it is the hope and expectation of its members that this organization will have a standing equal in public estimation with that of Horticultural and other Societies, for usefulness and intelligence of its membership in their calling, which they believe is second in importance to none.

For the premiums offered for the best kept Flower Garden, we had no application.

Orchid House of E. W. Gilmore.

For the best House of Orchids in bloom in the month of March, Thomas Greaves, gardener to E. W. Gilmore, North Easton, entered the house under his care. The visit was made March 22. The cool-house orchids, which were the special feature, were in admirable condition. The house is a small lean-to, and modest in every way. The following varieties were in bloom at the time of our visit.

Angræcum sesquipedale. An extraordinary plant, and one of the orchids in which Charles Darwin was especially interested, on account of the exceptional length of the spur. The flowers are very fragrant, and will last nearly a month.

Cattleya citrina. A fragrant and beautiful orchid, having the curious habit of growing its head downwards. The flowers are of a soft lemon yellow, the margin of the lip wavy and white. They are delightfully fragrant, and last a long time.

C. Trianæ, in variety.

Cypripedium bellatulum.

C. Boxallii.

C. callosum.

C. Harrisianum.

C. Hookeræ.

C. Lowii.

C. villosum. This and the six preceding are choice and select species.

Dendrobium chrysotoxum.

D. Findleyanum.

D. Freemanii. There were seventy-two blooms on this plant.

D. heterocarpum.

D. Jamesianum.

D. nobile, and varieties, including a lovely white one.

D. Pierardii.

D. primulinum.

D. Wardianum. A very beautiful species, of which there were fifteen fine plants, with from twenty-five to seventy-five blooms on each.

Lycaste Skinneri is one of the most desirable of the orchids, and should be in every collection.

Masdevallia Reichenbachiana.

M. tovarensis. The only pure white-flowered species.

Odontoglossum Alexandræ. About fifty plants were in bloom.

O. Cervantesii, in number.

O. gloriosum.

O. luteo-purpureum.

O. Œrstedii. A small and very pretty species.

O. Pescatorei. Thirty plants in bloom.

O. Rossii. In number; one of the best of the smaller kinds, and growing and flowering very freely.

O. tripudians.

O. triumphans. A splendid lot: these are large flowered, easily managed, and deservedly the most popular of the genus.

O. Wilckeanum. Rare.

Oncidium papilio. A fine plant with ten blooms; this is the beautiful Butterfly Orchid, and is a very interesting species.

O. sarcodes. A very handsome variety.

Phalænopsis Schilleriana, a very desirable variety; the foliage

and flowers are both extremely handsome, and there was a fine show of bloom.

P. Stuartiana, also distinct and very handsome.

There was a total of two hundred and five plants in bloom, and many varieties that were not in bloom. All the plants were well grown and showed by their condition, which was excellent in every respect, that much skill and care had been bestowed upon them. The houses devoted to their cultivation were moderate sized and what might be termed inexpensive, demonstrating fully the incorrectness of the idea which was once entertained that expensive houses are requisite to the successful cultivation of this beautiful and highly ornamental class of plants. Time will not permit us to go into any further details, which might perhaps be interesting to some, on the cultivation of cool-house orchids; but all who would like to study the subject can purchase one or more of the following books, which are full of good practical information, and cannot fail to interest such readers: "Cool Orchids, and How to Grow Them," by F. W. Burbidge," and "Orchids; their Structure, History, and Culture," by Lewis Castle. These are both English works and can be had for about one dollar each. A still later work, "Orchids; their Culture and Management," by W. Watson, of the Royal Gardens, Kew, is a more extensive and a very valuable work, costing about five dollars.

Oakley Park, Watertown, the Residence of Robert M. Pratt.

The members of the Society will undoubtedly remember the fine exhibits of Orchids which were made a few years ago by David Allan, the gardener at this place. It is not necessary to tell you that what Mr. Allan does is well done; proof of that is shown by his works, and his skill as a cultivator we all acknowledge. On the 20th of March your Committee were invited to visit Mr. Allan and inspect his Dendrobiums, which were all arranged in a small span-roofed house. Upon opening the door the sight presented was truly magnificent, and it is not saying too much when we inform you that the Committee were enthusiastic over the rich treat they were invited to enjoy. To give an adequate idea of it is beyond our power. If by any description that we might be able to give of that array of beauty we could rouse your imagination to an appreciation of the scene, we would gladly do it. There were

about three hundred plants, from the smallest in a thumb pot to large basket specimens, some with hundreds of flowers on them. The Dendrobiums are a lovely genus of orchids, easily grown, and profuse bloomers, the well-known *D. nobile* being one of the best winter flowering varieties and grown in large quantities. We are reminded here of an answer to a question propounded to Louis Menand, the well-known and greatly respected Albany florist. When asked which were the best three orchids to cultivate, he gave as his choice *D. nobile* for all three. The unusual excellence of this collection has induced us, as far as possible, to give descriptions of the plants then in bloom, that you may form some slight idea of their merits.

D. Ainsworthii. A hybrid between *D. nobile* and *D. aureum* (*heterocarpum*). A beautiful kind; the flowers large, sepals and petals French white, tipped with rose purple; lip of a deep amethyst red, with a white margin.

D. Bensoniæ. The flowers are lovely; the sepals and petals are milk white, the lip is white with an orange centre and ornamented near the base with two large velvety black blotches.

D. Cambridgeanum, with sepals and lip of a beautiful bright yellow, centre dark brown, is one of the finest of all yellow orchids.

D. crassinode has sepals and petals richly tipped with deep purple rose; the lip white, with an orange-colored blotch at the base.

D. Dominianum. A cross between *D. Linawianum* and *D. nobile.* Flowers of a bright rosy purple, but white towards the base of the sepals and petals.

D. fimbriatum has rich orange-colored flowers, the margin of the rounded lip being beautifully bordered with a golden moss-like fringe.

D. Findleyanum is pinkish lilac in the sepals and petals, the lip a rich orange yellow at the base, becoming a lighter and brighter yellow at the margin.

D. Freemanii is an extremely beautiful orchid; the flowers are similar to those of *D. nobile*, but the color is far deeper; the dark purple blotch on the shell-like lip is margined with white.

D. Leechianum. A hybrid between *D. aureum* and *D. nobile.* This is very near *D. Ainsworthii*, but larger and deeper colored.

D. Linawianum. — Flowers nearly white in the centre, the outer portion of the sepals and petals being a pale rosy lilac or cerise;

the lip is small, white, with two purple blotches in front, and is wholly purple in the throat.

D. nobile and varieties. — Among the latter *D. nobile nobilius* was very noticeable. It is a gorgeous flower, the sepals and petals colored a very rich glowing amethyst, paler towards the base; lip deep maroon, with a zone of milk white in front.

D. senile is a curious orchid; the flowers, of a clear yellow color, are about one inch across, and very showy.

D. Wardianum is remarkable for the size of the flowers; the sepals are a rich amethyst with a margin of white; the petals also white, tipped with amethyst, as is the lip; the colors are very deep and rich.

The following varieties of Odontoglossum were noted:

O. Alexandræ. — Sepals and petals rich deep lilac, rose, or mauve; petals white suffused with mauve; lip prettily frilled, white, stained with yellow at the base.

O. Andersonianum. — The blossoms resemble those of *O. cirrhosum* in form and size, but the spots and markings, instead of being a purplish blue, are of a reddish-brown color. It is a very distinct and valuable variety.

O. cirrhosum is one of the most beautiful species in the white-spotted purple group.

O. Pescatorei. — Flowers large and pure white, with a blotch of purplish crimson on the base of the lip.

O. Rossii. — Sepals white, barred with brown; petals pure white, with a few spots at their bases only; lip pure white, with a lemon-yellow bi-lobed crest; column white.

O. triumphans is a large flowered, easily managed species and one of the most popular of the genus. Its sepals and petals are bright yellow, blotched with deep brownish crimson; lip oblong, with a narrow tail-like tip; the edges toothed, the front portion being cinnamon brown, and the basal half pure white, with a yellow centre; the crest, which is usually white, has two long teeth.

Masdevallias are valuable, as some are always in flower.

M. Barlæana is a pretty species, scarlet; very free.

M. Davisii is of rich orange yellow, distinct and handsome.

M. ignea is very bright fiery red, shaded with crimson or violet rose, and is said to be unsurpassed for brilliancy in the vegetable kingdom.

M. Veitchiana has the outer surface of the petals tawny yellow,

the inner surface rich orange scarlet, and is said to be probably the finest species yet introduced.

Cattleya citrina has been already mentioned.

In other houses we noticed in bloom

Cattleya Trianæ, var. *Mendelii*.

Cypripedium Harrisianum.

C. insigne and its varieties.

C. Lawrenceanum.

C. œnanthum.

C. rexillarium superbum.

C. villosum.

Our attention was directed to a fine lot of *Staphylea colchica*, one of the very best plants for forcing.

A few Cyclamens were still in bloom; the variety in the flowers was particularly striking, the color varying from a deep magenta to a pure white. The Cyclamen also is a specialty with Mr. Allan.

Adiantum Farleyense is another specialty. The great number of plants, and the luxuriant fronds on each, were especially noticeable. This is known as one of the most magnificent Adiantums.

A large quantity of *Lilium candidum* promised well. Many other things might be noted, but attention has been called to a sufficient number already to give assurance that the excellence of the plants grown at Oakley Park is still maintained. All the plants showed care and skill in cultivation. After leaving the houses we were taken to the cold-frames where the violets were grown, and the same skill in cultivation was evident there; they were not grown very close together, but the flowers were unusually fine and produced in great abundance.

Although this was an *impromptu* visit, it was one of the most satisfactory that your Committee have been permitted to enjoy.

Forcing-Houses of Hittinger Brothers, Belmont.

A hasty glance was given to the forcing-houses for early vegetables which are conducted by Hittinger Brothers, who informed us that they had already (March 20) taken two crops of lettuce from the large house, which is 635 feet long by 25 to 30 feet wide, and is divided by a glass partition, and were now taking out the third crop. In the other houses tomatoes were as large as hens' eggs; cucumbers were set, while radishes, parsley, and watercress, — all grown in the greatest abundance, — were ready for

use. Every department was in excellent condition, and we regret that the darkness of the evening coming on prevented our making a more thorough examination of the excellent arrangements for growing winter vegetables so successfully used by these gentlemen; but we hope in the near future to be able to give more in detail such facts as will be of interest to the Society.

Market Strawberry Garden of Samuel Barnard.

In our previous reports we have called attention to the strawberry gardens of Warren Heustis & Son and Samuel Barnard, both at Belmont. This season the Committee were again invited to examine a bed of the Jewell strawberry at Mr. Barnard's, and it is with an unusual degree of satisfaction that we can report that this bed was a very superior one in every way, and that Mr. Barnard continues rightfully to enjoy his well-earned reputation as a leading cultivator of the strawberry. The Jewell has been awarded a Silver Medal by the Society, and it is a satisfaction to be able to note that it still proves worthy of the award. It has always been spoken of in the highest terms, and is considered one of the most productive large strawberries ever introduced. It is a fine grower, and has never shown any signs of rust or blight. The berries are large, bright red, changing to crimson when very ripe, firm and of good quality. It is said to be a seedling of the Jersey Queen.

Amateur Strawberry Garden of Benjamin M. Smith, Beverly.

This was visited June 21. The one variety demanding our special attention was the new seedling Beverly. For information in regard to it we refer you to the report of the Fruit Committee of this year, and for the mode of cultivation and management of Mr. Smith's garden, to his statement, which is appended. This is the first application that we have had to visit an amateur strawberry garden, and we sincerely hope that others will follow.

Letter of Benjamin M. Smith.

Beverly, Nov. 18, 1890.

Mr. John G. Barker, *Chairman Committee on Gardens:* —

Dear Sir, — Your letter of the 11th instant, requesting me to write you my experience in growing strawberries, and also about the new seedling, Beverly, I have received. My first experience was

at Meredith, N.H., in 1863. Since then, at Newbury, Haverhill, Salem, and Beverly, I have grown the Agriculturist, Charles Downing, Bidwell, Atlantic, Mrs. Garfield, Prince of Berries, Daniel Boone, Miner's Prolific, Belmont, May King, Crescent, Jessie, Jewell, and last the Beverly. I have grown them in area from a small bed to an acre. For garden culture I prefer to grow them in hills, with double rows, one foot between the hills each way, two and one-half feet between the rows, and to keep all runners cut off. The garden I entered for a prize is in size about forty by ninety feet; about two-thirds of it was set out in August, 1888, and the spring of 1889, and the other third in August, 1889, after harvesting corn and beans. The ground had been well fertilized in the spring with stable manure and street scrapings from the streets of Salem. After harvesting the corn and beans, I spaded in ground bone and unleached ashes, — about one-third bone to two-thirds ashes, — and used on the whole garden, I should think, fifty pounds of bone and four bushels of ashes. I set out runner plants with what earth could be taken up readily with the trowel, and kept them watered until new roots started. They were hoed as often as once in two weeks; once a week would be better. All the runners were cut off. About December 1, I covered them with leaves and threw on a little stable manure to keep the leaves in place. I got the best results from plants set in August, as above, — as good as from plants set in the spring. If one has plenty of land he should not grow strawberries more than two years on the same piece of ground.

The history of the new seedling, Beverly, is as follows: In July, 1887, I sowed seeds from the Miner's Prolific. In June, 1888, I got good specimens from them. Among those that bore fruit one seemed very promising. In the summer of 1888 I set out what plants it made, which formed a row about twenty-two feet long. I cut off no runners, as I wished for plants as well as fruit. On one side of this row, twenty-two feet long, I set a row of Belmonts, and on the other side a row of Jewells, each fifty feet long. Treated as well as the seedling, I should say that both rows did not yield any more fruit than the space of twenty-two feet, where I put out the new seedling, though I do not say it would ever do that again. From that twenty-two feet row I got runners enough to set out one-third of my garden, in August, 1889, as stated. Last June you and your Committee saw how they were bearing,

the quality of the berries, and the vigor of the plants. Some one of the Committee asked me what would become of all those green berries that were set on the plants, and my reply was that most of them would mature, which they did.

I will now briefly recapitulate the case of the seedling Beverly. In the spring of 1888 there was *only one plant*. In the summer of 1890 I picked eight bushels and twenty-four quarts of berries from the Beverly strawberry plants. The yield from the whole garden was fifteen bushels and sixteen quarts.

The Beverly strawberry plant is the most vigorous, and the most free from rust of any plant I ever saw.

I invite those who are interested to visit my garden in the season of 1891, and see for themselves what it is.

Respectfully yours,

BENJAMIN M. SMITH.

The Committee have made the following awards for the year 1890: —

To Thomas Greaves, for the best house of Orchids in bloom during the month of March, the premium of .	$60 00
To Benjamin M. Smith, for the best Amateur Strawberry Garden, the premium of	30 00
To David Allan, for a very fine house of Dendrobiums, a gratuity of	30 00
To Samuel Barnard, for a superior bed of Jewell Strawberries, a gratuity of	15 00

We again call your attention to the changes in the amount to be offered in prizes in 1891 by the Committee on Gardens. If any one cannot compete for these, but has any other object of interest to the Society or the public, it will be a pleasure to give it our best consideration, and a request to the Chairman that the Committee should examine any such object, will be gladly received and cheerfully attended to.

This report was read at a meeting held Jan. 27, 1891, and approved by a majority of the Committee.

JOHN G. BARKER, *Chairman*.
JOSEPH H. WOODFORD,
C. N. BRACKETT.
HENRY W. WILSON,
C. W. ROSS.

REPORT

OF THE

COMMITTEE OF ARRANGEMENTS,

FOR THE YEAR 1890.

By PATRICK NORTON, Chairman.

As the year draws to a close it becomes the duty of your Committee to make a report of their doings during the past season.

Nearly all of the exhibitions have been very gratifying and satisfactory, and have met the hearty approval of the public.

Meetings of the Committee have been held during the year, whenever it was necessary to make arrangements for the various large exhibitions; and with the coöperation of the other Committees, the various plans and methods adopted have been carried out with credit to the Society and to the pleasure of visitors.

The Spring Exhibition was of unusual excellence, and so also was the Rose and Strawberry Show. The arrangement of the tables has been such as to display the exhibits to their best advantage, and in much better form than has usually been practised.

The Grand Exhibition in Music Hall, in August, entailed a large amount of expense; and the study in planning the arrangement of the enormous quantity of plants and flowers offered, and the labor of placing them so as to produce the best effect, were very considerable; but the plans were so fully completed, and so carefully carried out, that every one was accommodated in a satisfactory manner. One of the great features of this Exhibition was the contribution, by outside parties, of silver plate to the amount of $820, offered as Special Prizes to be awarded at this time. This was entirely the work of the Committee of Arrangements, and was a most important feature of this successful exhibition.

The advertising, and the courtesy of the press in calling the attention of the public to our exhibitions throughout the year, has never been excelled; and the economy of all this, as far as the Society is concerned, is to be credited to this Committee.

Your Committee feel that great progress has been secured during the year in the various interests pertaining to our Society, and we confidently hope that it will continue in the future.

The expenses attending the exhibitions during the year have been as follows: —

Spring Exhibition	$249 44
Rose and Strawberry Exhibition	133 36
Annual Exhibition of Plants and Flowers	2,460 51
Annual Exhibition of Fruits and Vegetables	289 04
Chrysanthemum Show	293 81
	$3,426 16

The receipts were as follows: —

Spring Exhibition	$500 25
Rose and Strawberry Exhibition	198 00
Annual Exhibition of Plants and Flowers	2,108 28
Annual Exhibition of Fruits and Vegetables	172 25
Chrysanthemum Show	1,667 00
	$4,645 78

showing a balance of $1,219.62 in favor of the Society, which has been passed into the treasury.

Out of the appropriation of $300, which was placed at the disposal of this Committee at the beginning of the year, there has been expended $296.50.

All of which is respectfully submitted.

PATRICK NORTON,
JOS. H. WOODFORD,
C. N. BRACKETT,
E. W. WOOD,
Committee of Arrangements.

REPORT

OF THE

COMMITTEE ON WINDOW GARDENING,

FOR THE YEAR 1890.

By HENRIETTA L. T. WOLCOTT, Chairman.

At the close of the season of out-of-doors work, the Committee on Window Gardening beg leave to report for the year the exhibitions and their results.

Owing to a misunderstanding among the exhibitors of the year 1889, as to notification, but few windows were offered for examination in March, 1890. In those that were entered a most satisfactory condition, as to growth under unfavorable surroundings, was observed, notwithstanding the gas and furnace heat, which usually proves fatal to free blooming. In cool apartments, Narcissus — the variety lately introduced by the Chinese — and Amaryllis seem as serviceable as Scarlet Zonale Pelargoniums and our faithful friend, the Begonia.

During the winter months the Committee had considered the plan of granting prizes in money, and the objections thereto. Gratuities, even in small sums, and the prizes for excellence drew perceptibly on the limited resources of the Committee. Yet the example set by the Society, under whose authority we act, could not be entirely ignored.

The encouragement of *the love of flowers in the community* was the acknowledged purpose of the founders of this Society. They made no special note of the business element which so largely obtains at present, and this love of flowers seemed in danger of being overcome by the love of candy, the small gratuities often serving to purchase the desired treat.

Considering this plan then as at least open to criticism, the Committee substituted plants as gifts and prizes. Then came the question, "How can plants of suitable age be secured for the later months?" To keep cuttings or small plants three or four months must add to the expense.

Through the most cordial coöperation of George A. Parker, — a member of the Society, and himself a lover of both plants and children, — space in his greenhouses was offered for the growing and caring for all the plants we needed.

Cuttings and seeds were purchased at wholesale prices, and the results proved that the work was not commenced any too early to meet the demands made upon us. Seven classes in Boston schools were taking courses of lessons in Botany, and at that season preparing for an exhibition of their progress. The germination of seeds, and the propagation of plant-life by slips, had been carefully noted day by day, and a record had been kept for future reference. Your Committee were invited to be present. After carefully observing their work, it seemed wise to furnish to those who wanted to continue their investigations seedlings which were then in fine condition. Most gratefully were they received and distributed by teachers and pupils. About one thousand seedlings of Asters, Coreopsis, Dianthus, Hardy Carnations, Lobelia, Sweet Williams, *Nicotiana affinis*, Candytuft, and Sweet Alyssum, were the principal annuals, while Abutilon and Heliotrope were among the hardier perennial plants. These were heard from during the summer. Each collection was carefully labelled with the botanical and common name. This was considered necessary to discourage the habit, among raisers of plants, of propagating error while they propagate plants. Like all untruths, false names mislead, perhaps not the dealer, but the seeker after knowledge. For instance, the pretty white flower sold as Stevia is not that at all. Its botanical name is Piqueria, from that of a Spanish botanist, and it is very much more desirable for decorative purposes than the Stevia, which has a stiff stem bearing a close cyme of blossoms at the head of the upright stalk. The true names can be mastered by persons of the average intelligence, as well as the incorrect ones.

Previous to the Easter celebrations your Committee had been asked to aid in arranging and presenting the flowers provided for a mission school near Roxbury, and to present flowers and explain

the plan of the Massachusetts Horticultural Society. Eight schools were visited that day. When it is remembered that before the Window Gardening Committee was formed but one school in Boston had ever given pot plants, the contrast which was observed in 1890 was encouraging. About 13,000 pot plants were distributed in the various schools in the State.

In one or two instances the florist was authorized to put a water-proof cover over the earthen pot, thus preventing many untoward accidents resulting from carrying dirty pots.

The first exhibition of this year was held in June, at the Church of the Good Shepherd, whose faithful pastor has interested himself in the work of this Committee since its formation Forty-five plants were there, each and every one of which had been the especial care of a child. They were well-grown and free from torn or dead leaves or stems. The pots were clean, and the labels distinctly marked. One family of six children brought an astonishing collection. A visit to their home later in the season revealed the fact that the mother, while encouraging the children to water and shelter the plants in the small enclosure called garden, — on which the sun's rays fell with terrible effect in August and September, — had little leisure to help them. A sick husband, an infant in arms, and the whole care of a family of nine, gave her enough to do. The welcome addition of six other plants gave to the household much joy.

In August, the second exhibition was held in the rooms of the North Bennet Street Industrial School, which were kindly offered to the children of the public schools in the neighborhood. Fifty well-grown plants — Geraniums, Fuchsias, Tradescantias, and Abutilons — were presented by the children, who came again later in the day for them. One plant of *Acacia Farnesiana*, raised by an invalid girl, was well-grown and handsome. Had it been in flower, it would have had double the prize.

Owing to either the poverty or indifference of parents, some of the plants requiring to be shifted from the two and one-half inch pots in which the florist sold them, had been buried in ten-inch pots, "because it was all there was in the house." The Committee sent for a few four-inch pots, and shifted them, thus giving a lesson in thoroughness to the children, who watched the process with great interest.

In the past three years your Committee had experienced diffi-

culties in securing opportunities for exhibitions in the hall of this Society, without encroaching on the customary claims of the other Committees. We desired to secure results, not troubles, and therefore held our exhibitions in such church parlors or halls as were offered; and as children could not be expected to take long walks twice in one day, — and the only holiday they had, — that plan was considered excellent. Endeavoring this year not to interfere with the use of the halls for the Florists, or the Fall Exhibitions, we decided to attempt an out-of-doors exhibition at Franklin Park. This plan received the approbation of all interested. The application for permission to assemble in the grounds, so well adapted for the purpose, was granted, "said exhibition to be held immediately following the opening of the public schools." With the appointed day came the usual fall rain, and so tempestuous was it that it might well have been deemed a second deluge. The Committee were on hand to receive and arrange the five hundred plants, each in four-inch pots, in excellent condition for winter growth and flowering. Alas, for the plans of men, which "gang aft agley"! The cars ceased running up the hill to the entrance of the Park. The man whose services had been granted by the Commissioners to assist in unloading, failed to put in an appearance. The work was delayed until help could be secured, thus adding materially to the expenses in an entirely unforeseen manner.

After considering that should the clouds roll by, as they did later in the day, the condition of the grass would utterly preclude games or strolling about the walks, the Committee arranged for a postponement, sent the children, who were waiting at the car-station, to their homes, gave a fine plant, brought by a school girl from the extreme North end of Boston, into the charge of the matron, and left the wet grounds in season to advertise in the evening papers that due notice of the postponement would be given in the Sunday-schools on the morrow.

The next Saturday came, but a dreary week of rain and steamy atmosphere had made it no pleasanter for a floral show. The plants, which had been grown in open air and sunlight for six or seven weeks, felt the change to a cool, dark cellar, closely stowed in the boxes. Their appearance cannot be adequately described by any words in the English language — only the imagination can picture their wretched condition. The successful exhibitors of

July and August had notified us that they could not exhibit their plants if they were to carry home another, and their parents thought it too stormy for the little ones to come. In spite of the discouraging weather, all the plants were distributed to glad recipients. Clergymen, teachers of mission schools, and philanthropic workers among the occupants of cheerless tenements, came and approved.

In March, by a vote of the Society, action on a paper on "Horticultural Education for Children," read by Henry L. Clapp, Principal of the George Putnam School, Roxbury, was referred to this Committee.

General coöperation throughout the State among pupils of the public schools was desired to secure the object in view. Circulars were distributed generally, offering prizes for the best collections of dried plants, ferns, or grasses, and giving all details as to paper suitable for the work; and the proposition was made that all such collections, when correctly named, if not classified, should be the nucleus of a town herbarium. Records of the flowers, grasses, ferns, birds, and insects, found in each town, would be of lasting benefit.

In response to this, two collections were offered, and the prize of two dollars was awarded to Gilman H. Hitchings for ferns, and the same to Phillips Barry for flowers. Please notice the fact that these collections were correctly labelled according to Gray, and that the lads were under thirteen years of age. Young Barry also received the first prize for a collection of native flowers, in forty-nine vases. The correct naming of the Asters and Solidagos would have severely taxed the botanical ability of the majority of the members of this Society. He also showed four plants rarely grown here. On the label of a pot of *Sedum honidulum*, I think, was this notice: "The bit of plant, from which these pots have been grown, came from Europe in a botanical press. I soaked it out and planted it." This thoughtfulness in so young a lad is rarer than his plants, but much can be accomplished by training the faculties to observe details.

Cordially desiring to find inexpensive plants easily grown in windows, the Chairman attended, at some sacrifice, the sessions of the Convention of American Florists held in the halls of this Society. But it was very evident that the writer of the paper advertised, and his fellow-members, had little conception of the needs

of this Committee. Palms, Aspidistra, *Ficus elastica*, and Ferns are easily managed by a gardener's assistant in the conservatory or large window in some favored sunny locality. They are expensive, too large, and do not bear bright-colored blossoms. Color always carries a fascination to a child. Gifts of two of the members of this Society, comprising a valuable *Begonia Rex*, *Poinsettia*, and *Solanum capsicastrum*, which, on account of their size, were relegated to older raisers, will take their places in the windows offered for exhibition later in the season; which windows must not be subjected to a sudden fall of temperature when the maid-of-all-work opens a window, or the neat housekeeper must secure ventilation and thoroughly air the apartment.

The more hardy plants — Ivy, Cactus, Sedum, and Allium, with Narcissus, and occasionally a pot of Scilla or Oxalis, well grown — will eventually lead to the care of more delicate plants. This is what your Committee hope to accomplish.

Neither cast down nor discouraged, we ask for a continuance of your coöperation. A real enthusiasm for flowers should be divorced, for a time at least, from the consideration of the money value which underlies many of the exhibitions weekly offered in our halls.

If the Society deems the encouragement of children in the culture of flowers to be only charitable work, we would ask whether much of all work in the line of distribution of prizes is not open to the same criticism. But we feel sure the Society builded better than it thought when it assumed the formation of a Committee to encourage Window Gardening. Put on to the Committee some of the younger members — if there be such — who can out of their experience help on the good cause. The absence of active young members opens the question: Why is it? Possibly the idea is prevalent in the community that membership requires a business education as a florist.

Allow the Committee the services of the paid attendants of the Society the few times during the season when they are so needed. If we can vote the use of our halls for days at a time to strangers for their own advantage, do in justice see to it that the funds appropriated for this Committee are not encroached upon by such needs. At every meeting we hold in the State the Horticultural Society receives heartily expressed recognition from the Chairman and the Secretary of this Committee. We

ask that the Society, through its Committee, aid schools to get this plan started, feeling sure that like the ones at Greenfield, and Harvard street, Boston, they will soon become self-sustaining.

Respectfully submitted,

HENRIETTA L. T. WOLCOTT,
Chairman, for the Committee.

REPORT

TO THE

STATE BOARD OF AGRICULTURE,

FOR THE YEAR 1890.

By GEORGE CRUICKSHANKS, of Fitchburg.

The work of the Massachusetts Horticultural Society for the year 1890 is completed, but not so the influence that it is having on the Horticulture of this country. The sum of six thousand dollars was appropriated to be awarded in premiums and gratuities during the season.

The year began with a course of Essays and Discussions on subjects connected with the work of the Society, as follows: —

January 11. The Horticulture of California, by Benjamin P. Ware, Clifton.

January 18. Huckleberries and Blueberries, — Gaylussacia and Vaccinium sp., by Dr. E. Lewis Sturtevant, Framingham.

January 25. Fruits and Flowers of Northern Japan, by William P. Brooks, Professor of Agriculture, Massachusetts Agricultural College, Amherst.

February 1. Galls found near Boston, by Miss Cora H. Clarke, Jamaica Plain.

February 8. Chrysanthemums, by W. A. Manda, Short Hills, N.J.

February 15. Cemeteries and Parks, by John G. Barker, Superintendent of Forest Hills Cemetery, Jamaica Plain.

February 22. The Growth and Nutrition of Plants, by Professor G. H. Whitcher, Director of the New Hampshire Experiment Station, Hanover, N.H.

March 1. Some Aspects of the Present Forestry Agitation, by Joseph T. Rothrock, Professor of Botany at the University of Pennsylvania, West Chester, Pa.

March 8. Heating Cold Frames by Hot Water or Steam; and

Growing Black Hamburg Grapes under Glass that is otherwise used in Winter, by William D. Philbrick, Editor of the Massachusetts Ploughman, Boston.

March 15. Horticultural Education of Children, by Henry L. Clapp, Principal of the George Putnam School, Roxbury.

March 22. Dahlias, by William E. Endicott, Canton.

March 29. The Tour of the Grangers in California, by O. B. Hadwen, Worcester.

These essays and discussions are fully reported, and published in the TRANSACTIONS of the Society.

The Annual Spring Exhibition opened in the two halls of the Society, on the 26th of March, continuing three days, and rarely in the history of the Society has a more beautiful display of flowers been seen at that season of the year. The large upper hall presented a fine appearance; the great variety of plants and flowers, with all their varied colors, being so arranged as to show all to the best advantage. The lower hall was devoted to the display of Vegetables, Fruits, and Greenhouse and Decorative Plants; also a rare collection of plants from the Cambridge Botanic Garden, and the show of spring flowering bulbs — Hyacinths, Tulips, Narcissus and Liliums — with the great variety of colors and the sweet odors of that class. There were also the Cytisus, with its bright yellow flowers; the Azaleas, the Cinerarias, the Cyclamens, and the Orchids. All the vegetables were of fine quality.

With the month of June we always associate the fragrant Rose and the aroma of the Strawberry. The display of June 24 and 25, under the title of the Rose and Strawberry Exhibition, was one that could not only vie with all its predecessors, but in some important respects outvied them all, comprising an uncommonly large and brilliant display of beautiful flowers and delicious fruits. In these particulars this exhibition was, perhaps, in a fuller sense than some in the past, a strictly Rose and Strawberry Show. The upper hall was devoted to the floral, and the lower to the fruit display, and each claimed its due proportion of the attention of visitors and admirers. The space allotted to the Rose was full, and the exhibition was complete. The Rose is ever making advances on its own record, both in excellence and variety.

The Annual Exhibition of Plants and Flowers was held in Music Hall, beginning August 19, and continuing four days. This far surpassed any that the Society has ever given. One

could well fancy himself in some tropical forest as he strolled among Palms over twenty feet high, with large Cycads on either hand, and the great platform covered with Tree Ferns, Arecas, gayly variegated Crotons, richly colored Dracænas, the beautiful Anthuriums, the Agapanthus, Allamanda, and Ixoras. On the floor, besides the larger Palms, Cycads, Crotons, Dracænas, etc., were large collections of other plants, including the fantastic Orchids, the majestic Amazonian Lily, and many large exotic shrubs, both of blooming and of ornamental foliage varieties.

The bronze statue of Beethoven never before looked down on such a magnificent display of floral beauty in Music Hall. The show of cut flowers was large, including Petunias, Tuberous Begonias, Sweet Peas, Drummond Phlox, Zinnias, Dahlias, Gladioli, Gloxinias, and a large collection of hardy herbaceous plants. One of the most attractive features was found in the great tanks and tubs containing the Nymphæa and other aquatic plants, among which were the Egyptian Lotus and the Victoria Regia. Another interesting display was that of the floral decoration of mantels and tables for a fashionable dinner party. Much interest was taken in this department of the exhibition.

It is safe to say that never before has so choice and valuable a collection of Stove and Greenhouse Plants been brought together in this country. A representative of one of the leading Botanic Gardens in England was present and expressed strong doubt as to whether Great Britain could show so many rich and beautiful products of the gardener's skill at a single exhibition. Never was there such a profusion of these plants shown; they overflowed into the corridors, and even out upon the sidewalks leading to the hall.

No previous Annual Exhibition of Fruits and Vegetables made by this Society has presented the precise counterpart of that which opened September 17. It filled the two spacious halls with the largest and most varied display of fruits and vegetables ever made at an exhibition of this Society. The upper hall was devoted to the fruits, and the lower hall to vegetables. The Apples, Pears, and Peaches were of large size and fine quality, notwithstanding the short crop in many sections of this State. The show of Grapes, Native and Foreign, was large. Several bunches of the foreign grapes weighed between eight and nine pounds each. A very interesting and instructive exhibit was made by the Massachusetts Agricultural College, under the charge of Professor

S. T. Maynard. There were sixty varieties of hardy grapes, arranged and numbered in the order of their ripening; and side by side were placed vines, fruit, and foliage of several sorts, one free from all diseases, the other so badly affected with mildew as to be worthless. This was to illustrate the value of spraying the vines with the Bordeaux Mixture as a preventive of mildew and other diseases of the grape. The Arnold Arboretum also made a fine display of seventy-one varieties of fruit-bearing shrubs, all in fruit or flower. Near the entrance to the upper hall was a novelty at these exhibitions, — a large collection of preserved fruits, meats, and vegetables in glass jars and cans, — one hundred and forty-three kinds of English meats, forty-five of German goods, and a large lot of French goods in glass.

The Chrysanthemum Show opened November 11, and continued four days, the Queen of Autumn flowers being shown in great profusion. It was admitted by all to have been unsurpassed by any exhibition of Chrysanthemums ever seen in Horticultural Hall. The lower hall was devoted to the cut flowers, which were fittingly crowned by the collection in vases on the platform. The upper hall was devoted to pot plants, which, for large size, variety of color, and perfect form of plants and flower, has not been equalled by this Society. The Committee in charge are entitled to much credit for the admirable arrangement of the tables for the display of cut flowers and the grouping of the plants in pots. New colors are added from year to year; besides the pure white and the clear yellow there were the deep violet-pink, a peculiar lemon color with violet tips, the dark crimson, and the beautiful Mrs. Alpheus Hardy, — white, with its feathery covering. A large number of choice seedlings were shown for the first time.

When we recall the larger exhibitions of 1890, beginning with the Spring Show in March, with its wealth of bloom, followed by the Rose and Strawberry Show in June, with its grand display of fruits and flowers; the magnificent Exhibition of Plants and Flowers in Music Hall, in August; the large Fruit and Vegetable Show in September; and closing with the Grand Exhibition of the National Flower of China and Japan, — it is safe to say that the exhibitions of 1890 have never been equalled in any previous year in the history of the Massachusetts Horticultural Society.

George Cruickshanks,
Delegate.

REPORT

ON THE

STATE EXPERIMENT STATION,

AT AMHERST.

Under the able management of Professor Goessmann the various work more especially related to agriculture is continued as heretofore. The analyses of the numerous commercial fertilizers; the application of the same to the different kinds of crops; the different methods of cultivation; the careful testing of various rations for the production of milk, or for fattening purposes; — these are some of the objects which are receiving attention. During the past year land has been prepared and fruit trees of various kinds have been set, with reference to future experiments. This department of the Station has already exerted a most beneficial influence upon the Agriculture of the State, and there is every reason to expect continued good results.

The work entered upon by Professor Humphrey will be of special interest to horticulturists. Confining himself to the investigation of the fungous diseases of plants, we may hope that such thorough investigations will be made as shall reveal the nature of the diseases and suggest practical remedies. It is reasonable to expect an advance of knowledge in the vegetable kingdom equivalent to that which has recently startled the world by the discoveries of Professor Koch in the animal kingdom. By a very liberal grant from the State, an admirable plant-house, together with offices and laboratory, has been erected during the past year. This will give to Professor Humphrey greatly increased facilities for carrying forward his investigations at all seasons of the year. For some time past he has had, and he still has, in hand the disease known as "black-knot," most prominent upon the plum. The importance of this investigation is so fully realized by horticulturists that we shall be liable to be impatient for results. But this is

work which requires long and most minute observation, and we can well afford to be patient, if we can be assured of diligent use of the facilities now furnished. We have reason to believe that an era of progress has fairly set in. The general government has provided ample funds for the employment of experts in the various States, and though some of the work may not be of the highest order, yet it cannot be doubted that, in the aggregate, a great amount of valuable original research will be made which will be of inestimable importance to the nation. Let the good work go forward, and let us give it the support of our sympathy.

WILLIAM C. STRONG,
Member of the Board of Control.

REPORT

OF THE

COMMITTEE ON THE LIBRARY,

FOR THE YEAR 1890.

Nothing in the history of the Library during the present year calls for much remark. As usual all the money available has been expended. The number of books added from the income of the Stickney Fund has probably been somewhat less than usual, because the Committee had an opportunity, early in the year, to purchase a copy of Gallesio's "Pomona Italiana" at a price advantageous to the Society. This is a truly magnificent work, and one which we are very glad, after some years of waiting, to have obtained. It is not necessary to name others of our purchases, as they will all appear in the list appended to this report; but in variety they will be found about as usual, covering the whole field from Forestry to Floriculture.

During the year the books have been rearranged upon a systematic plan, a change long desired but not possible until the recent addition to our shelf-room. A glance at our well-filled cases will show that the relief did not come too soon; another glance will show that even now many shelves have a back row of books.

The botanical and horticultural periodicals have been continued as in former years. These are paid for out of the Society's appropriation, as is the binding, of which a considerable quantity is still in arrears. This is unavoidable, for the work of arranging for the binder such books as Blanco's "Flora of the Philippines," and the "Pomona Italiana" just mentioned, takes a long time and much study. A very noticeable feature in the matter presented to the Library is the great number of reports of Experiment Stations from almost every State of the Union and from Canada; some of these are very interesting and instructive.

The Catalogue of Plates has made its usual progress, and has been found useful by many searchers. A high testimonial to its value is the fact that the authorities of the Botanic Garden of Harvard University have desired to copy it in part for their own use.

In the great press of other work, little has been done on the index of subjects and the much-needed catalogue of books, but we hope soon to make a fresh beginning upon it.

We are glad to know that the use of the Library is on the increase, and we welcome all interested persons to the use of it in the room, whether members or not, for it would be disgracefully illiberal to restrict the use of such treasures as are here collected more than their safety requires.

For the Committee,

W. E. Endicott,
Chairman.

LIBRARY ACCESSIONS.

The measurements of the books in the following lists are in inches and tenths of an inch, giving first the height, next the thickness, and lastly the width. When a pamphlet is less than one-tenth of an inch in thickness the place of that dimension is supplied by a dash.

Books Purchased.

Meager, Leonard. The Compleat English Gardner: or, A Sure Guide to Young Planters and Gardners. Tenth edition. Half calf, 7.9×.7×6.3, pp. 8, 150; 24 plates. London: 1704.

Miller, Philip. The Gardeners and Florists Dictionary: or, A Complete System of Horticulture. 2 vols. Full calf, 7.9×1.5×5., pp. xvi (dedication and preface); the rest not paged. London: 1724.

Hitt, [Thomas.] The Modern Gardener; or, Universal Kalendar. Selected from the Diary Manuscripts of the late Mr. Hitt. Revised, corrected, etc., by James Meader. Full calf, 7.2×1.3×4.2, pp. 532; 13 plates. London: 1771.

Stevenson, ——. The Gentleman Gard'ner's Director. Being Instructions for Planting and Sowing Trees and Seeds, etc. With Directions for the Management of Bees. The Second edition. Full calf, 6.6×.7×4., pp. ix, 273, iii. London: 1744.

Lawrence, John, A.M. The Clergyman's Recreation: Shewing the Pleasure and Profit of the Art of Gardening. In two parts. Fifth edition. (Also) The Fruit Garden Kalendar; or, a summary of the Art of Managing the Fruit Garden. Second edition. To which is added an Appendix of the Usefulness of the Barometer; etc. Full calf, 8.2×1.1×5., pp. 10, 84, 18, 115, 2, 2, vi, v, 149; 6 plates, 2 cuts. London: 1717 and 1718.

Quintinye, Jean de la. The Compleat Gard'ner: or, Directions for Cultivating and right ordering of Fruit-Gardens and Kitchen Gardens. Abridged, etc., by George London and Henry Wise. Second edition. Full calf, 7.9×1.1×4.7, pp. xxxv, 4, 309, 7; frontispiece and 10 plates. London: 1699.

Thompson, Robert. The Gardener's Assistant: Practical and Scientific. New edition, revised and extended by Thomas Moore, F.L.S., assisted by eminent practical gardeners. Green cloth, 10.5×3.3×6.8, pp. iv, 23, lii, 956; 32 plates, colored and plain, 402 cuts. London: 1888.

Henderson, Peter. Garden and Farm Topics. Dark blue cloth, 7.6×.8×5., pp. 244; cuts. New York: 1884.

Hibberd, Shirley. The Garden Oracle and Floricultural Year Book. 1890. 32d year. Boards, green, 7.×.5×4.8, pp. 172; 2 colored plates. London: 1890.

Meader, James. The Planter's Guide: or Pleasure Gardener's Companion. Etc., etc. Half brown morocco, 5.6×.6×11., pp. 7, 39, 8; 2 plates. London: 1779.

Royal Horticultural Society of London. Journal. New series. Vol. IV. (Parts 13–16.) Edited by the Rev. M. J. Berkeley, M.A., F.L.S., F.R.H.S., and W. T. Thiselton Dyer, B.A., B.Sc., F.L.S. Four pamphlets, tea, 8.5×.1–.2×5.4, pp. ii, xl, 274; plates v–ix, colored and plain; cuts. London: 1873, '74, '74, '77.

The Philadelphia Florist and Horticultural Journal. Vols. 1–4, bound in 2. Black cloth, 9.1×1.9×6.3. Vol. 1, pp. 376; 6 colored plates: — Vol. 2, pp. 392; 11 colored plates: — Vol. 3, pp. iv, 380; 10 colored plates: — Vol. 4, pp. 288; 1 plain and 8 colored plates. Philadelphia: n. d. [1852–1855?]

Robinson, W. The English Flower Garden. Style, Position, and Arrangement; followed by a description of all the best plants for it; their culture and arrangement. Forming Vol. I. of the "Garden Cyclopædia." Second edition. Blue-green cloth, 9.3×1.6×6.1, pp. x, 832; many cuts. London: 1889.

D'Ombrain, Rev. H. Honywood, *Editor*. The Rosarian's Year-Book for 1890. Boards, blue-gray, 7.1×.4×5.3, pp. vi, 67; portrait. London: 1890.

Harkness, John, F.R.H.S. Practical Rose Growing; A Guide for Amateurs in the Cultivation of the Rose for Exhibition and Decorative Purposes. Gray paper, 7.3×.3×5.4, pp. v, 63; 3 cuts. Bradford, Eng.: 1889.

Lyons, J. C. A Practical Treatise on the Management of Orchidaceous Plants, with a monthly calendar of work to be done, and an Alphabetical Descriptive Catalogue of upwards of one thousand species; with directions for their growth and flowering. Second edition greatly enlarged. Dull green cloth, 8.1×.7×5., pp. xvi, 17–234; cuts. Dublin: 1845.

Warner, Robert, F.L.S., F.R.H.S., Benjamin Samuel Williams, F.L.S., F.R.H.S., Henry Williams, F.R.H.S., and William Hugh Gower. The Orchid Album, comprising colored figures and descriptions of new, rare, and beautiful Orchidaceous Plants. Vol. 9, parts 99–104. Colored plates 393–416, and descriptive text. London: [1890].

Sander, F. Reichenbachia. — Orchids illustrated and described. Vol. 2, parts 7–12. Half green morocco, 21.6×2.×19.6, pp. 57–106; colored plates, 73–96. Second series. Vol. 1, parts 1 and 2. pp. iv, 18; 8 colored plates. St. Albans, London, Berlin, Paris, and Summit, N.J. [1890.]

Linden, J., Lucien Linden, and Émile Rodigas. Lindenia. — Iconographie des Orchidées. Vol. 5, 1889, parts 3–12. Half green morocco, 14.1×1.2×11.3, pp. 21–102; colored plates, 201–240. Vol. 6, 1890, parts 1–3, pp. 28; colored plates, 241–252. Gand: 1889, 1890.

Fitzgerald, R. D., F.L.S. Australian Orchids. Vol. 2, parts 2 and 3.

Half mottled orange-colored cloth, 19.4×.2×13.5, 11 and 10 colored plates, and descriptive text. Sydney, N.S.W.: 1885 and 1888.

Castle, Lewis, *Editor.* The Chrysanthemum Annual. 1890. Pamphlet, blue-green, 6.9×.1×4.5, pp. 22; 1 portrait. London: 1890.

Simkins, James. The Pansy: and How to Grow and Show it; with the best methods of Hybridization with a view to improvement, etc., etc. Blue cloth, 7.3×.5×5., pp. 8, 112; 4 colored plates, 13 cuts. Birmingham & London: 1889.

Gallesio, Giorgio. Pomona Italiana, ossia trattato degli alberi fruttiferi. 3 volumes (in 41 fasciculi). Half maroon morocco, 19.5×2.5×14., 1 plain and 159 colored plates. Pisa: 1817–1834.

(*Also*) Gli Agrumi dei Giardini Botanico-Agrarii di Firenze distribuiti methodicamente in un Quadro Sinottico, etc. pp. 12; 1 plate. Firenze: 1839. [Bound at the end of Vol. 3 of the Pomona Italiana.]

Maund, B., F.L.S. Orchard and Garden Fruits: their Description, History, and Management. Green cloth, 9.×.5×7.3; 24 colored plates, with descriptive text. London: n. d.

French Gardiner: instructing how to cultivate all sorts of Fruit-trees, and Herbs for the Garden. Together with directions to Dry, and Conserve them in their Natural. Written originally in French and now Translated into English. By John Evelyn, Esquire. Third edition. Whereunto is annexed, the English Vineyard Vindicated by J. Rose, etc.: with a Tract of the making and ordering of Wines in France. Dark maroon cloth, 5.7×.9×3.8, pp. [6], 294, 48, [16]; 3 plates. London: 1675.

Bonavia, E., M.D. The Cultivated Oranges and Lemons, etc., of India and Ceylon. 2 vols. Blue-green cloth. Vol. 1, 8.9×1.6×5.5, pp. xix, 384; Vol. 2, 7.7×2.4×9.9, 259 plates. London: 1890.

Diel, August Friedrich Adrian. Versuch einer systematischen Beschreibung in Deutschland vorhandener Kernobstsorten. 21 volumes. Boards, marbled blue, 6.4×.5–.8×4., 1 colored plate in No. 8. Frankfurt a. M.: 1799–1819.

——— ——— ——— ———. Systematisches Verzeichniss der vorzüglichsten in Deutschland vorhandenen Obstsorten, mit Bemerkungen über Auswahl Güte und Reifzeit für Liebhaber bei Obstanpflanzungen. Boards, marbled blue, 6.4×.6×4., pp. xvi, 159. Frankfurt a. M.: 1818.

——— ——— ——— ———. Systematische Beschreibung der vorzüglichsten in Deutschland vorhandenen Kernobstsorten. 6 volumes. Boards, marbled blue, 6.4×.6–.8×4., 1 colored plate in each. Stuttgart und Tübingen, 1821–1832.

Meyer, H., *Editor.* Generalregister zu Dr. Aug. Friedr. Adr. Diel's Systematischer Beschreibung der vorzüglichsten in Deutschland vorhandenen Kernobstsorten. Dull blue paper, 9.7×.3×4.3, pp. 130. Braunschweig: 1834.

Trowbridge, J. M. The Cider Makers' Hand Book. A Complete Guide for Making and Keeping Pure Cider. Maroon cloth, 7.5×.6×5., pp. 119; 16 cuts. New York: 1890.

E[velyn], J[ohn], S.R.S. (Author of the Kalendarium.) Acetaria. — A Discourse of Sallets. Boards, marbled brown, 6.5×.6×4., pp. [38], 192, [49]. London: 1699.

Rustic Furniture, proper for Garden Seats, Summer Houses, Hermitages, Cottages, etc. Half calf, 9.2×.5×5.9. 25 plates. London, n. d. [1825?]

Decorations for Parks and Gardens. Designs for Gates, Garden Seats, etc., etc. Half sheep, 9.4×.7×6.1, 55 plates. London, n. d. [1770?]

Jäger, H. Gartenkunst und Gärten sonst und jetzt. Handbuch für Gärtner, Architekten und Liebhaber. Light brown cloth, 10.5×1.3×7.2. pp. 8, iv, 529; 245 cuts. Berlin: 1888.

Newhall, Charles S. The Trees of North-Eastern America. With an Introductory Note by Nath. L. Britton, E.M., Ph.D. Olive-green cloth, 9.5×1.×6.2. pp. xiv, 250; cuts 116 and *a–x*. New York and London: 1890.

Boulger, G. S., F.L.S., F.G.S. Familiar Trees. Second series. Gray cloth, 7.2×1.1×5.2. pp. xvi, 168; 40 colored plates by W. H. J. Boot. London, Paris, New York, and Melbourne: n. d.

Brown, J. E., F.L.S., etc. The Forest Flora of South Australia. Part 8. Half red cloth, 21.8×—×17., 5 colored plates, with descriptive text. Adelaide, South Australia. n. d. [1890?]

Cleghorn, Hugh, M.D., F.L.S. The Forests and Gardens of South India. Half green calf, 7.8×1.8×5., pp. xiv, 412; map, 13 plates, 17 cuts. London: 1861.

Bradley, R. A Survey of the Ancient Husbandry and Gardening, Collected from Cato, Varro, Columella, Virgil, and others, the most eminent Writers among the Greeks and Romans: etc. Full calf, 7.9×1.2×4.9. pp. 16, 373, 10; 4 plates. London: 1725.

Prothero, Rowland E. The Pioneers and Progress of English Farming. Dark blue cloth, 7.7×1.1×5., pp. xiv, 290. London: 1888.

Our Country Home. Vol. 5, Nos. 8, 9, and 10. Vol. 6, Nos. 5, 6, and 7. Pamphlets, 15.3×—×10.6. New York: November, 1888–October, 1889.

Miller, Thomas. English Country Life. Consisting of Descriptions of Rural Habits, Country Scenery, and the Seasons. Half calf, 7.1×1.3×4.8. pp. xiii, 479; cuts. London: 1859.

Curiosities of Nature and Art in Husbandry and Gardening. Full calf, 7.5×.9×4.5. pp. 352; 13 plates. London: 1707.

Griffiths, A. B., Ph.D., F.R.S.E., F.C.S. Manures and their Uses: a Handbook for Farmers and Students. Salmon-colored cloth, 7.3×.6×4.6. pp. xii, 159; 1 map, 12 cuts. London: 1889.

Lawes, *Sir* J. B., Bart., LL.D., F.R.S., and Professor J. H. Gilbert, LL.D., F.R.S. On the present Position of the Question of the Sources of the Nitrogen of Vegetation, with some new Results, and preliminary Notice of new Lines of Investigation. Buff paper, 11.8×.3×9., pp. 107. London: 1889.

Wrightson, John, M.R.A.C., F.C.S. Fallow and Fodder Crops. Green cloth, 8.3×1.×5.4; pp. xii, 276. London: 1889.

Royal Agricultural Society of England. Journal.

Second Series. Vol. 25, Part 2.—No. 50, October, 1889. pp. viii, 381–792, xli–ccxxiv; cuts.

Third Series. Vol. 1, Part 1.—No. 1, March 31, 1890. pp. iv, 256, lxiv; cuts.

Part 2.—No. 2, June 30, 1890. pp. viii, iv, 257–472, lxvi–xcvi; 1 map, 6 cuts.

Part 3.—No. 3, September 30, 1890. pp. iv. 473–672, xcvii–clxxxiv; cuts.

Four parts, blue paper, 8.4×.7–1.3×5.5. London: [1889, 1890.]

Highland and Agricultural Society of Scotland. Transactions. With an Abstract of the Proceedings at Board and General Meetings, the Premiums offered by the Society in 1889, and List of Members. Fifth Series, Vol. 1. Blue cloth, 9.×1.2×5.6, pp. iv, 279, 65, 87, 57, iv; cuts. Edinburgh: 1889.

Vol. II. 1890. Blue cloth, 9.×1.4×5.7, pp. iv, 399, 62, 89, iv; 2 cuts. Edinburgh: 1890.

Gibson, W. The True Method of Dieting Horses. Sheep, 7.7×.8×4.5, pp. viii, iv, 4, 236, vii. London: 1721.

Church, A. H., M.A. Oxon, F.C.S., F.I.C. Food Grains of India. Brown cloth, 10.5×.7×7.7, pp. xi, 180; 35 cuts. London: 1886.

Tropical Agriculturist. A Monthly Record of Information for Planters of Tea, Coffee, Cacao, Cinchona, Sugar, Cotton, Tobacco, Palms, Spices, Rubber, Rice, and other products suited for Cultivation in the Tropics. Vol. 8. Green cloth, 10.8×2.×7.3, pp. xvi, 868, also supplementary pages on Sales of Tea, Coffee, etc. Colombo, Ceylon: 1889.

Royle, J. Forbes, M.D., F.R.S. The Fibrous Plants of India, fitted for Cordage, Clothing, and Paper. With an Account of the Cultivation and Preparation of the Flax, Hemp, and their substitutes. Light brown cloth, 9.1×1.5×5.8, pp. xiv, 404. London and Bombay: 1855.

Timehri: Being the Journal of the Royal Agricultural and Commercial Society of British Guiana. New series.

Vol. III, Part 2, December, 1889. pp. 209–403; 5 plates.

Vol. IV, Part 1, June, 1890. pp. 186.

Two parts, light blue-green paper, 8.7×.7×5.5. Demerara and London: 1889, 1890.

Todaro, Augustino. Hortus Botanicus Panormitanus, sive plantæ novæ vel criticæ quæ in orto botanico Panormitano coluntur, etc. Tomus secundus, fasciculus quintus. (In continuation.) Magenta paper, 19.×—×13.3, pp. 33–40; plates 33, 34. Panormi: n. d. [1890?]

Jacquin, Nicolaus Joseph. Hortus botanicus Vindobonensis, seu plantarum rariorum quæ in horto botanico Vindobonensi . . . coluntur. Three volumes in one. Half Russia, 19.1×3.3×12. Vol.

1, pp. 8, 44; 1 colored plan and colored plates 1–100. — Vol. 2, pp. 2, 45–95, ii; colored plates 101–200. — Vol. 3, pp. 4, 52; colored plates 1–100. Vindobonæ: 1770–1777.

Tournefort, Joseph Pitton. Institutiones Rei Herbariae. Editio altera, gallica longe auctior, quingentis circiter tabulis æneis adornata. 3 vols. bound in 2, including the Corollarium. Parchment, 9.6×2.3–2.9×7.2. Vol. 1, pp. 20, 697, 6, 1, 54, 5; Vol. 2, plates 1–250, 251–476, 477–489. Paris: 1700–1703.

Plukenet, Leonard, M.D. Opera omnia botanica, in sex tomos divisa; viz., I, II, III, Phytographia; IV, Almagestum Botanicum; V, Almagesti Botanici Mantissa; VI, Amaltheum Botanicum. 6 volumes bound in 4. Old calf, 11.2×1.–2.1×8.3. Vol. 1 (I, II, and III), pp. 4, 6; 328 plates. — Vol. 2 (IV), pp. 4, 5, 402, ii. — Vol. 3 (V), pp. 4, 192, 28; plates 329–350. — Vol. 4 (VI), pp. 5, 214, 11; plates 351–454. Londini: 1691–1720.

Theophrastos, Eresios. Theophrasti Eresii de Historia Plantarum Libri Decem, Græce. Cum Syllabo Generum et Specierum, Glossario, et Notis. Curante Joh. Stackhouse. 2 vols., full calf, 7.4×1.×4.9, pp. lii, 241, and 509; 4 plates. Oxonii: 1813, 1814.

Hooker, *Sir* J. D., K.C.S.I., C.B., M.D., F.R.S., etc. Icones Plantarum; or figures, with descriptive characters and remarks, of new and rare plants, selected from the Kew Herbarium. Vols. 8 and 9. Buff paper, 8.8×.4×5.5, plates 1701–1900, with descriptive text. London, Edinburgh, and Berlin: 1887–1889.

Baillon, H. Histoire des Plantes. Monographie des Asclepiadacées, Convolvulacées, Polémoniacées, et Boraginacées. Blue paper, 10.9×.5×7., pp. iv, 221–402; cuts 157–300. Paris: 1890.

Baker, J. G., F.R.S., F.L.S. Hand-book of the Bromeliaceæ. Blue-green cloth, 9.×.7×5.7, pp. ix, 243. London: 1889.

André, Ed. Bromeliaceæ Andreanæ. Description et histoire des Broméliacées récoltées dans la Colombie, l'Ecuador et le Venezuela. Half black cloth, 12.7×.6×9.7, pp. xi, 118; 40 plates. Paris: n. d. [1889?]

Bolus, Harry, F.L.S. Orchids of the Cape Peninsula. [Transactions of the South African Philosophical Society. Vol. V. — part I.] Buff paper, 9.8×.7×6., pp. viii, 75–201; 36 plates, colored and plain. Cape Town: 1888.

Jacobi, G. A. von. Versuch zu einer systematischen Ordnung der Agaveen. 4 pamphlets [to complete the work], 8.5–9.8×—×5.4–6.3, pp. 4, 34; 297–315; 317–319, 12; 12. Hamburg & Breslau: 1854 to ——.

Gray, Asa. Manual of the Botany of the Northern United States, including the district East of the Mississippi and North of North Carolina and Tennessee. Sixth edition, revised and extended westward to the 100th meridian, by Sereno Watson and John M. Coulter. Olive-brown cloth, 8.4×1.5×5.4, pp. vi, 760; 25 plates, with descriptive text. New York and Chicago: 1890. [2 copies.]

Hind, W. M., LL.D., assisted by the late Churchill Babington, D.D., F.L.S. The Flora of Suffolk; A Topographical Enumeration of the Plants of the County, showing the Results of Former Observations and of the most recent Researches. With an Introductory Chapter of the Geology, Climate, etc., by Wheelton Hind. Red cloth, 7.6×2.×5.2, pp. xxxiv, 508; colored map. London: 1889.

Painter, *Rev.* W. H. A Contribution to the Flora of Derbyshire. Being an account of the Flowering Plants, Ferns, and Characeæ found in the County. Olive-green cloth, 9.×.7×5.8, pp. vii, 156; colored map. London and Derby: 1889.

Parnell, Richard, M.D., F.R.S.E. The Grasses of Britain. Faded green cloth, 10.×2.×6.3, pp. xxvii, v–xxi, 311; 142 plates. Edinburgh and London: 1845.

Pratt, Anne. The British Grasses and Sedges. Green cloth, 9.2×.9×5.8, pp. viii, 136; colored plates 238–272. London: [1859].

Parlatore, Filippo. Flora Italiana, continuata da Teodoro Caruel. Vol. VIII, Part 3. Plumbaginacee, per Antonio Mori; Primulacee, per Lodovico Caldesi; Diospiracee, Stiracacee, Ericacee, Vacciniacee, Pirolacee, Monotropacee. Blue paper, 9.2×.5×6.1, pp. 561–773. Firenze: Ottobre, 1889.

Hooker, *Sir* J. D., C.B., K.C.S.I., etc. Assisted by various botanists. The Flora of British India. Vol. 5. Chenopodiaceæ to Orchideæ. Dark blue-green cloth, 8.9×2.×5.5, pp. 909, 16. London: 1890.

Willkomm, Maurice. Illustrationes Floræ Hispaniæ insularumque Balearium. Livraison XVI. [In continuation.] Blue paper, 14.2×.1×10.2, pp. 85–98; plates 138–146. Stuttgart: 1889.

Pierre, L. Flore Forestière de la Cochin-Chine. 15e fascicule. Half claret cloth, 22.×.4×15.6, plates 225–240 with descriptive text. Paris: n. d. [1890?]

Mueller, Ferd. von, K.C.M.G., M. & Ph.D., F.R.S. Iconography of the Australian Species of Acacia and cognate Genera. Decades 5–13. Buff paper, 12.1×.2×9.7, 10 plates in each. Melbourne: 1887, 1888.

——— ———. The Plants indigenous to the Colony of Victoria. 2 vols. Half green morocco, 12.1×1.2–1.5×9.4. Vol. 1, Thalamifloræ. pp. viii, 242; plates 1–12, and supplementary plates 1–11; Vol. 2, Lithograms. pp. iii; plates 13–71, and suppl. plates 12–18. London: 1860–1865.

Hooker, Joseph Dalton, M.D., R.N., F.R.S., and L.S., etc. Flora Novæ Zelandiæ. Part I, Flowering Plants; Part II, Flowerless Plants. 2 vols. Half claret morocco, 12.6×1.9×9.7, pp. xxxix, 312, and 378; colored plates, —70, and 71–130. London: 1853, 1855.

Wawra v. Fernsee, Dr. Heinrich. Itinera Principum S. Coburgi. Die Botanische Ausbeute von den Reisen ihrer Hoheiten der Prinzen von Sachsen-Coburg-Gotha. Bearbeitet und herausgegeben von Dr. Günther v. Beck. Zweiter theil. Half plum-colored cloth, 14.×1.1×10.8, pp. vi, 250; 18 plates, colored and plain. Wien: 1888.

Bennett, Alfred W., M.A., B.Sc., F.L.S., and George Murray, F.L.S. A handbook of Cryptogamic Botany. Brown cloth, 8.3×1.1×5.5, pp. viii, 473; 382 cuts. London: 1889.

Cooke, M. C. Illustrations of British Fungi (Hymenomycetes). To serve as an Atlas to the "Hand Book of British Fungi." by M. C. Cooke. Nos. LXVI to LXXIV. Blue-gray paper, 9.×.2×6., colored plates 1035–1174. London: 1888–1890.

Torrey Botanical Club. Bulletin. Index to Vols. 7–16. Compiled by E. G. Britton. Pamphlet, tea, 9.×.1×5.8. pp. xx. 31. New York: 1890.

Linnean Society of London. Proceedings. Vol. I. Nov., 1838–June, 1848. Vol. II, Nov., 1848–June, 1855. 2 vols. in 1. Half green morocco, 8.5×2.3×5.5. pp. xv. 401, and xiii. 448. London: 1849, 1855.

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Bulletin No. 25. A Popular Treatise on the Extent and Character of Food Adulterations. By Alex. J. Wedderburn, Special Agent. Pamphlet, tea, 9.×.1×5.7, pp. 61. Washington: 1890.

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Experiment Station Bulletin. Nos. 3–6, July, 1889,–May, 1890. (3.) Report of a Meeting of Horticulturists of the Agricultural Experiment Stations, at Columbus, Ohio, June 13, 14, 1889. By A. W. Harris, Assistant Director. (4.) List of Horticulturists of the Agricultural Experiment Stations in the United States, with an outline of the work in Horticulture at the several Stations. Prepared by W. B. Atwood. (5.) Organization Lists of the Agricultural Experiment Stations, and Agricultural Schools and Colleges in the United States. (6.) List of Botanists of the Agricultural Experiment Stations in the United States, with an Outline of the Work in Botany, at the several Stations. 4 pamphlets, tea, 9.×—×5.7. Washington: 1889, 1890.

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Maine Board of Agriculture. Thirty-third Annual Report of the Secretary, for the year 1889–90. Black cloth, 9.5×1.6×6., pp. v, 242, 216, 176; plates and cuts. Augusta: 1890. Z. A. Gilbert, Secretary.

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Connecticut Board of Agriculture. Twenty-second Annual Report of the Secretary, 1888. With Annual Report of the Connecticut Agricultural Experiment Station for 1888, and the First Annual Report of the Storrs School Agricultural Experiment Station. Black cloth, 9.1×1.5×6., pp. 340, vii, 166, 104, 13; 1 plate, cuts. Hartford: 1888, 1889.

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S. C., November, 1890. Pamphlet, fawn, 9.2×.1×5.8, pp. 46. Charleston: 1890. Thomas W. Holloway, Secretary.

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Texas Agricultural Bureau of the Department of Agriculture, Insurance, Statistics, and History. Second Annual Report, 1888–89. L. L. Foster, Commissioner. Pamphlet, fawn, 9.1×.8×6., pp. xxiii, 387; cuts. Austin: 1890. H. W. Nye.

Iowa State Agricultural Society. Annual Report of the Board of Directors for the year 1889. Black cloth, 9.×1.7×6.6, pp. 671. Des Moines: 1890. John R. Shaffer, Secretary.

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Fluted Scale. By Albert Koebele. Pamphlet, tea, 9.×—×5.6, pp. 32; 16 cuts. Washington: 1890.

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Galls of Cynipidæ. — Various Galls. Two volumes of Photographs taken by Miss Cora H. Clarke. Half Russia, 10.8×1.×9.1. Miss Clarke.

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Elisha Mitchell Scientific Society. Journal. 1889. Volume 6, part 2, July to December, 1889. Pamphlet, light tea, 9.×.3×5.8, pp. 41–161; 9 plates and cuts. Raleigh, N. C.: 1890. Vol. 7, part 1, January–June, 1890. Pamphlet, blue, 8.9×.1×5.7, pp. 56; 2 plates. Raleigh, N. C.: 1890. F. P. Venable, Permanent Secretary.

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Smithsonian Institution, Fifth Annual Report of the Bureau of Ethnology to the Secretary of the. 1883–84. By J. W. Powell, Director. Dark olive cloth, 11.6×2.1×7.8, pp. liii, 564; 23 plates and maps, colored and plain; 76 cuts. Washington: 1887. Sixth Annual Report. 1884–85. By J. W. Powell, Director. pp. lviii, 675; 10 plates and plans and 546 cuts. Washington: 1888.

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Textile Fabrics of Ancient Peru. By William H. Holmes. Pamphlet, tea, 9.7×—×6.1. pp. 17; 11 cuts. Washington: 1889.

The Problem of the Ohio Mounds. By Cyrus Thomas. Pamphlet, tea, 9.7×.1×6., pp. 54; 8 cuts. Washington: 1889.

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Education of the Colored Race. What Texas . . . has done . . . and is . . . doing for the education and betterment of the colored race. Pamphlet, 9.2×—×6.1. pp. 3. H. W. Nye.

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Interstate Commerce Commission. Third Annual Report, December 1, 1889. Dark claret cloth, 9.2×1.2×5.9, pp. 463. Washington: 1889. W. G. Veazey, Commissioner.

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——, Report of the Comptroller of Public Accounts of the State of, for the year ending August 31, 1889. Black cloth, 9.4×1.×6.1, pp. 366. Austin: 1890. H. W. Nye.

——, State of. Governor's Message and Inaugural Address. Olive-brown cloth, 9.3×.2×6., pp. 23. H. W. Nye.

——, Biennial Report of the Secretary of State of, 1888. J. M. Moore, Secretary. Pamphlet, fawn, 9.2×.6×6., pp. 297. Austin: 1889. H. W. Nye.

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North Shore of Massachusetts Bay. 12th edition. Pamphlet, light blue-green, 7.1×.3×4.7, pp. 103; cuts, maps. Salem: 1890. B. D. Hill.

Wootton. [A Description, etc., from Ashmead's History of Delaware County, Pennsylvania.] Pamphlet, 5.3×—×3.4, pp. 48. D. D. L. Farson, Secretary of the Pennsylvania Horticultural Society.

Grand Rapids as it is. 1890–1. Published by the Grand Rapids Board of Trade. Pamphlet, green and white, 9.2×.1×12.1, pp. 52; cuts. The Board of Trade.

L'Afrique en 1890. Notice et Carte. (Carte extrait de l'Atlas de Géographie moderne, par F. Schrader, F. Prudent, et E. Anthoine.)

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PERIODICALS PURCHASED.

ENGLISH. — Gardeners' Chronicle.
Gardeners' Magazine.
Journal of Horticulture and Cottage Gardener.
The Garden.
Gardening Illustrated.
Horticultural Times and Covent Garden Gazette.
Curtis's Botanical Magazine.
Journal of Botany.
Grevillea.

FRENCH. — Revue Horticole.
Revue des Eaux et Forêts.
Journal des Roses.

BELGIAN. — Illustration Horticole.
Revue de l'Horticulture Belge et Étrangère.
Journal des Orchidées.

GERMAN. — Botanische Zeitung.

AMERICAN.—Country Gentleman.
Garden and Forest.
American Naturalist.
American Journal of Science.
Zoe.

PERIODICALS RECEIVED IN EXCHANGE.

Canadian Horticulturist.
American Garden.
Popular Gardening.
Vick's Illustrated Monthly Magazine.
Horticultural Art Journal.
American Florist.
Florists' Exchange.
Orchard and Garden.
Green's Fruit Grower.
Seed-Time and Harvest.
Forest Leaves.
Botanical Gazette.
Pittonia.

West American Scientist.
Maine Farmer.
New England Farmer.
Massachusetts Ploughman.
American Cultivator.
New England Homestead.
Our Country Home.
American Agriculturist.
Rural New-Yorker.
American Rural Home.
Farm Journal.
National Stockman and Farmer.
Germantown Telegraph.
Maryland Farmer.
Florida Dispatch, Farmer and Fruit Grower.
Prairie Farmer.
Orange Judd Farmer.
The Industrialist.
Pacific Rural Press.
Cottage Hearth.
Boston Daily Advertiser.
Boston Morning Journal.
Boston Post.
Boston Daily Globe.
Boston Evening Transcript.
Boston Daily Evening Traveller.
Boston Commonwealth.
Boston Times.
New York Weekly World.
Jeffersonian Republican.

REPORT

OF THE

SECRETARY AND LIBRARIAN,

FOR THE YEAR 1890.

First, as Secretary. At the date of my last report, Part II of the TRANSACTIONS for 1888 had just been placed in the hands of the printer. This was completed as speedily as possible, and it was then deemed best by the Committee on Publication to print next the first part for 1890, leaving the TRANSACTIONS for 1889 to be brought up afterwards, which was accordingly done, and the first part for 1889 has since been published. The second part for that year is nearly ready for the printer, and will be pushed to completion as early as possible. I regret exceedingly that with the utmost diligence I have been unable to wholly fill the gap existing, for nothing could be a greater relief to me than to feel that this whole matter was cleared up and could be dismissed from my mind until it is time to go to work on the next one.

It requires no argument to show that to be done to the best advantage the work on the TRANSACTIONS should be continuous, but thus far it has been impossible to command such time for this work. I wish that I, or any of those who equally with myself would like to have the publications of the Society appear more promptly, could devise some way in which I could devote my whole, or substantially my whole, attention to them until they were completed; but thus far this has not been effected, but on the contrary the calls on my time in other directions are still on the increase. As an instance, I may mention that when I commenced editorial work on the TRANSACTIONS, the Rose and Annual Exhibitions of the Society occupied only six days, the Spring and Chrysanthemum exhibitions being then merely "Saturday shows;" but the time devoted to "all day" exhibitions gradually crept up to twelve days, at which it remained until the present season,

when four more days were added. Now, it is impossible to count on doing any editorial work during these exhibitions, and the subtraction of four whole days from the time which can be given to this work is not unimportant. Moreover, the Committee of Arrangements have this year held twenty meetings (there having never been more than nine in any previous year), and at all but one of these I have been present and made the record. The gratifying success of the exhibitions of this season has not been attained without much incidental work in this department; indeed, it may be said that in whatever direction the operations of the Society broaden, additional work in this department is involved.

Second, as to the Library. When my last report was presented the work of systematically rearranging and cataloguing the whole Library was before us. The arrangement and classification has now been completed, and, though far from the ideal, is certainly a great improvement upon the past, and has received the commendation of those best qualified to judge. All the books on any given subject have been brought together as far as space permitted, though it has been impossible to carry this to perfection without wasting too much space. It was, however, not long before the progress of this work disclosed the fact that the bookcases, with all the additions recently made, are not more than sufficient properly to accommodate the books we now possess without any allowance for their increase. It is true that some empty shelves, or parts of shelves, may be seen, but these would be more than filled if all the books now placed behind others were brought into the front row. By properly accommodating, I mean allowing all the books to be arranged in a single row so that all can be seen without taking out books in front of them. When books are arranged in two rows on a shelf the usefulness of the Library is seriously impaired for the reason that many readers do not consult the Catalogue, and do not know that a book is in the Library unless they can see it on the shelf. But with all existing imperfections it is a great satisfaction to know that for the first time for years we can find any book belonging to the Library without going out of this room, and I trust that unless some extraordinary addition should be made to the Library, we may be able to accommodate them in this room, as long as the Society shall remain in this building.

After the books were arranged a count was made, which gave a total of 6,018 books and 5,889 pamphlets. The last previous

count was made in 1884, and showed 4,800 books and 1,350 pamphlets. The extraordinary increase in pamphlets is due to the large number of Agricultural Experiment Station Bulletins collected; to a large number of pamphlets contained in the donation from the family of our late President, Charles M. Hovey, received last year, and mentioned in my last report, and to a large number received as a donation from the New England Historic Genealogical Society. Besides the six thousand books and nearly six thousand pamphlets previously mentioned, the collection of Nursery, Seed, and Florists' Catalogues has been arranged alphabetically, and after rejecting duplicates, numbers nearly four thousand. Among them are some of the earliest catalogues of what is now the house of Joseph Breck & Sons, established in 1822, and the first Seed Catalogue issued by Hovey & Co., in 1835.

The most valuable books added to the Library this year are Gallesio's "Pomona Italiana" in three folio volumes with colored plates of the highest excellence, which was the greatest *desideratum* in the pomological department of the Library, and Hooker's "Flora Novæ Zelandiæ," a very scarce and valuable work, which we have for years been seeking as a companion to the "Flora Antarctica" and "Flora Tasmaniæ" of the same author.

The work of cataloguing the Library was begun immediately after the arrangement was completed. The first thing was to change the shelf number in the books, and the greater portion of this work is done. The next work will be to write on cards the name, description, and shelf number of each book.

In my report for 1887 I mentioned, as an indication of the rapid increase of books, that the record book of Library Accessions (other than those purchased from the Stickney Fund) which was begun in 1867, was filled in October, 1882, requiring a period of nearly sixteen years. Another book of the same size was then procured, which was filled at the end of November, 1887, a period of five years, showing that the additions to the Library therein recorded had averaged fully three times as many as in the first period. A third book of the same size has now been filled in three years, showing that the rapidity with which books are added to the Library, by donation and exchange, continues to increase.

ROBERT MANNING,
Secretary and Librarian.

TREASURER'S REPORT,

FOR THE YEAR 1890.

MASSACHUSETTS HORTICULTURAL SOCIETY, *in account current to December 31, 1890, with* W. WYLLYS GANNETT, *Treasurer:*

1890.	DR.		
Dec. 31.	To amount paid on account of the Library during 1890, viz.:		
	For books, periodicals, and binding .	$300 00	
	Income of Stickney Fund, expended for books	700 00	
			$1,000 00
	To amount paid on account of Furniture and Exhibition Ware during 1890		22 62
	To prizes awarded in 1889 and paid during 1890, as follows:		
	For Plants and Flowers . . .	$2,802 55	
	" Fruits	1,566 00	
	" Vegetables	937 00	
	" Gardens and Greenhouses . .	210 00	
	" Hunnewell Rhododendron prizes .	105 00	
	" Special Faxon prizes . . .	19 00	
	" Window Gardening prizes . .	300 00	
			5,939 53
	To amount paid for Salaries in 1890 .	$3,175 00	
	" " Extra Assistance in Library toward bringing up arrears of work . . .	473 00	
	" " Taxes in 1890 . .	2,606 80	
	" " Interest on mortgage, $25,000 at 4¼% .	1,062 50	
	" " City Water Rates .	90 50	
	Amounts carried over	$7,407 80	$6,962 17

Amounts brought over	$7,407 80		$6,962 17
To amount paid for Stationery, Printing, and Postage . .	1,662 81		
" " Publications and Discussions . .	164 75		
" " Card Catalogue of Plates . . .	100 00		
" " Expenses of Committee of Arrangements of 1890 . .	296 50		
" " Heating . . .	476 86		
" " Lighting . . .	1,518 21		
" " Labor, including Salaries of Janitor and Fireman . .	1,444 02		
" " Incidental Expenses of the year . .	633 47		
			13,704 42
To Investment of John Lewis Russell Fund in $1,000 Bond of Kansas City, Clinton & Spr. R.R. 5%			1,000 00
To Amount paid on account of Mortgage, September 22, 1890			10,000 00
To Interest on Funds for Prizes, credited . .			1,892 72
Total Payments of 1890 . . .			$33,559 31
To balance account, cash on hand, December 31, 1890			15,222 08
			$48,781 39

1890.	Cr.		
Jan. 1.	By Balance from account rendered December 31, 1889		$10,620 56
Dec. 31.	By Income from Building in 1890, viz.:		
	Rent of Stores . . $17,475 00		
	" Halls . . 9,639 05		
		$27,114 05	
	By Income Mount Auburn Cemetery for 1890	5,360 44	
	By Receipts from Annual Exhibitions,		
	gross amount . . $4,645 78		
	Less Expenses . . 3,426 16		
		1,219 62	
	By Receipts Admissions and Assessments of members . .	840 00	
	" Massachusetts State Bounty,	600 00	
	Amounts carried over	$35,134 11	$10,620 56

Amounts brought over		$35,134 11	$10,620 56
By Interest received on Bonds,	$422 50		
By Interest received on Deposits in Bank	183 00		
		605 50	
By Bond of Illinois Grand Trunk R.R., maturing October, 1890, and collected,		500 00	
By Receipts from sales of the History of the Society		9 50	
By Receipts from Marshall B. Faxon, for Special Prizes of 1889		19 00	
By Interest credited the following Funds, against charges opposite:			
Samuel Appleton Fund, $1,000, at 5%	$50 00		
John A. Lowell Fund, $1,000, at 5%	50 00		
Theodore Lyman Fund, $10,000, at 5%	550 00		
Josiah Bradlee Fund, $1,000, at 5%	50 00		
Benjamin V. French Fund, $500, at 5%	25 00		
H. H. Hunnewell Fund, $4,000, at 5%	200 00		
William J. Walker Fund, $2,354.43, at 5% . .	117 72		
Levi Whitcomb Fund, $500, at 5%	25 00		
Benjamin B. Davis Fund, $500, at 5%	25 00		
Marshall P. Wilder Fund, $1,000, at 5%. . .	50 00		
John Lewis Russell Fund, $1,000, at 5%. . .	50 00		
Josiah Stickney Fund, $12,000, amount	700 00		
		1,892 72	
			$38,160 83
			$48,781 39

W. WYLLYS GANNETT, *Treasurer.*

Boston, December 31, 1890.

Audited January 7, 1891.

H. H. Hunnewell, } *Finance*
Frederick L. Ames, } *Committee.*

MASSACHUSETTS HORTICULTURAL SOCIETY.

BALANCE SHEET, DECEMBER 31, 1890.

ASSETS.

Real Estate, Ledger account value		$250,000 00	
Furniture and Exhibition Wares		3,567 34	
Library		29,628 72	
Stereotype Plates and Copies of History		278 00	
Chicago, Burlington & Quincy R.R. 7% Bonds		1,500 00	
Chicago, Burlington & Quincy R.R. 4% Bonds, $5,000, cost		4,925 00	
Kansas City, Clinton & Springfield R.R. 5% Bond, $2,000, cost		1,980 00	
Cash on hand December 31, 1890		15,222 08	
			$307,101 14

LIABILITIES.

Mortgage on Building		$15,000 00	
Josiah Stickney Fund, payable in 1899 to Harvard College		12,000 00	
Prize Funds, invested in Building, viz.:			
Samuel Appleton Fund,	$1,000 00		
John A. Lowell "	1,000 00		
Theodore Lyman "	11,000 00		
Josiah Bradlee "	1,000 00		
Benjamin V. French Fund,	500 00		
William J. Walker "	2,354 43		
Levi Whitcomb "	500 00		
Benjamin B. Davis "	500 00		
H. H. Hunnewell "	2,500 00		
	$20,354 43		
Prize Funds, invested in Bonds as above:			
H. H. Hunnewell Fund,	$1,500 00		
Marshall P. Wilder "	1,000 00		
John Lewis Russell "	1,000 00		
	3,500 00		
		23,854 43	
Prizes of 1890 due and unpaid		6,300 00	
			57,154 43
Surplus			$249,946 71

W. WYLLYS GANNETT,
Treasurer.

Membership Account, December 31, 1890.

Number of Life Members per last report	573		
" added during 1890	12		
	585		
Deceased 1889–1890	23		
		562	
Number of Annual Members per last report	220		
" added during 1890	7		
	227		
Deceased 1889–1890	5		
Dropped for non-payment of dues	7		
	12		
		215	
Present membership			777

Income from Membership in 1890.

12 Life Members, @ $30	$360 00
7 Annual Members, @ $10	70 00
Assessments	410 00
	$840 00

Dr. *Massachusetts Horticultural Society in account with the Proprietors of the Cemetery of Mt. Auburn.* Cr.

For Sales and Improvements within the Cemetery for the year ending December 31, 1890.

To Cost of filling up and improving land at Mt. Auburn for the year ending December 31, 1890; the Massachusetts Horticultural Society being charged with their proportion of the same:			By Sales in January		$960 00
Glen Avenue	$834 56		" " February		1,575 00
Birch Avenue to Eagle and Cherry Avenues	120 94		" " March		665 00
	$955 50		" " April		3,892 00
			" " May		3,920 25
			" " June		2,017 00
			" " July		1,495 00
			" " August		635 00
			" " September		4,403 00
			" " October		1,275 00
			" " November		1,562 00
One-quarter of $955.50 is	$238 87		" " December		705 00
Balance due Massachusetts Horticultural Society,	5,360 44				$23,104 25
		$5,599 31	Net amount received from Receiving Tomb		768 00
					$23,872 25
			Less graves repurchased		75 00
					$23,797 25
			Deduct for Annual Expenses		1,400 00
					$22,397 25
		$5,599 31	Mass. Horticultural Society's one-fourth part of $22,397.25,		$5,599 31

E. & O. E.

H. B. MACKINTOSH, *Treasurer.*

December 31, 1890.

MASSACHUSETTS HORTICULTURAL SOCIETY

To the PROPRIETORS OF THE CEMETERY OF MOUNT AUBURN, *Dr.*

For one-fourth part of the following expenditures, for grading new lands for sale during the year 1890:

Glen Avenue.

188 days, men	$423 00	
109¾ days, man and horse	411 56	
		$834 56

Birch Avenue to Eagle and Cherry Avenues.

25 days, men	$56 25	
17¼ days, man and horse	64 69	
		$120 94
		$955 50
One-fourth part of $955.50 is		$238 87

MOUNT AUBURN, December 31, 1890.

I certify the foregoing to be a true copy of improvements for the year 1890, rendered by the Superintendent.

H. B. MACKINTOSH,
Treasurer.

Massachusetts Horticultural Society.

OFFICERS AND STANDING COMMITTEES FOR 1891.

President.

WILLIAM H. SPOONER, of Jamaica Plain.

Vice-Presidents.

CHARLES H. B. BRECK, of Brighton. FREDERICK L. AMES, of North Easton.
BENJAMIN G. SMITH, of Cambridge. NATHANIEL T. KIDDER, of Milton.

Treasurer and Superintendent of the Building.

CHARLES E. RICHARDSON, of Cambridge.

Secretary and Librarian.

ROBERT MANNING, of Salem.*

Recording Secretary.

ROBERT MANNING, of Salem.

Professor of Botany and Vegetable Physiology.

CHARLES S. SARGENT, of Brookline.

Professor of Entomology.

SAMUEL H. SCUDDER, of Cambridge.

Delegate to the State Board of Agriculture.

E. W. WOOD, of West Newton.

Delegate to the Board of Control of the State Agricultural Experiment Station.

WILLIAM C. STRONG, of Waban.

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* Communications for the Secretary, on the business of the Society, should be addressed to him at Horticultural Hall, Boston.

STANDING COMMITTEES.

Executive.

THE PRESIDENT, WILLIAM H. SPOONER, CHAIRMAN.
THE CHAIRMAN OF THE FINANCE COMMITTEE, H. H. HUNNEWELL, *EX OFFICIO;*
WILLIAM C. STRONG, FREDERICK L. AMES, CHARLES H. B. BRECK,
JOHN C. HOVEY, CHARLES S. SARGENT, BENJAMIN C. CLARK,
JAMES F. C. HYDE.

Finance.

H. HOLLIS HUNNEWELL, OF BOSTON, CHAIRMAN.
FREDERICK L. AMES. WILLIAM H. SPOONER.

Publication and Discussion.

O. B. HADWEN, OF WORCESTER, CHAIRMAN.
WILLIAM H. HUNT. FRANCIS H. APPLETON.

Establishing Prizes.

CHAIRMAN OF COMMITTEE ON FRUITS, CHAIRMAN.
CHAIRMEN OF COMMITTEES ON PLANTS, FLOWERS, VEGETABLES, AND
GARDENS, *EX OFFICIIS;* CHARLES M. ATKINSON,
J. WOODWARD MANNING, JR.

Library.

WILLIAM E. ENDICOTT, OF CANTON, CHAIRMAN.
THE PROFESSOR OF BOTANY AND VEGETABLE PHYSIOLOGY
AND THE PROFESSOR OF ENTOMOLOGY, *EX OFFICIIS;*
J. D. W. FRENCH. NATHANIEL T. KIDDER.
FRANCIS H. APPLETON. GEORGE W. HUMPHREY.

Gardens.

JOHN G. BARKER, OF JAMAICA PLAIN, CHAIRMAN.
CHAIRMEN OF COMMITTEES ON FRUITS, PLANTS, FLOWERS, AND VEGE-
TABLES, *EX OFFICIIS;* CHARLES W. ROSS,
HENRY W. WILSON.

Fruit.

E. W. WOOD, OF WEST NEWTON, CHAIRMAN.

BENJAMIN G. SMITH.	O. B. HADWEN.	SAMUEL HARTWELL.
CHARLES F. CURTIS.	WARREN FENNO.	J. WILLARD HILL.

Flowers.

ARTHUR H. FEWKES, of Newton Highlands, Chairman.

MICHAEL H. NORTON. JOHN H. MOORE.
WILLIAM J. STEWART. E. H. HITCHINGS.

Plants.

FREDERICK L. HARRIS, of Wellesley, Chairman.

DAVID ALLAN. JAMES COMLEY.
AZELL C. BOWDITCH. WILLIAM ROBINSON.

Vegetables.

CHARLES N. BRACKETT, of Newton, Chairman.

CEPHAS H. BRACKETT. VARNUM FROST. CHARLES A. LEARNED.
P. G. HANSON. JOHN C. HOVEY. JOSEPH H. WOODFORD.

Committee of Arrangements.

PATRICK NORTON, of Boston, Chairman.

CHAIRMEN OF COMMITTEES ON FRUITS, PLANTS, FLOWERS, VEGETABLES, AND GARDENS, *EX OFFICIIS;*

ROBERT FARQUHAR.

MEMBERS FOR LIFE.

Members of the Society and all other persons who may know of deaths, changes in residence, or other circumstances showing that the following list is inaccurate in any particular, will confer a favor by promptly communicating to the Secretary the needed corrections.

Information, or any clew to it, is especially desired in regard to members whose names are marked thus †.

Adams, Luther, Brighton.
Albro, Charles, Taunton.
Alger, R. F., Becket.
Allan, David, Mount Auburn.
Ames, Frank M., Canton.
Ames, Frederick L., North Easton.
Ames, George, Boston.
Ames, Hon. Oliver, Boston.
Ames, Preston Adams, South Hingham.
Amory, Charles, Boston.
Amory, Frederick, Boston.
Anderson, Alexander, West Hingham.
Andrews, Charles L., Milton.
Andrews, Frank W., Washington, D. C.
Andros, Milton, San Francisco, Cal.
Appleton, Edward, Reading.
Appleton, Francis H., Peabody.
Appleton, William S., Boston.
Atkins, Edwin F., Belmont.
Augur, P. M., Middlefield, Conn.
Avery, Edward, Boston.
Ayling, Isaac, M.D., Waltham.

Bancroft, John C., Boston.
Banfield, Francis L., M.D., Worcester.
Barber, J. Wesley, Newton.
Barnard, James M., Malden.
Barnard, Robert M., Everett.
Barnard, Samuel, Belmont.
Barnes, Walter S., Somerville.
Barnes, William H., Boston.
†Barney, Levi C., Boston.
Barratt, James, East Pasadena, Cal.
Barrett, Edwin S., Concord.
Bartlett, Edmund, Newburyport.
Bates, Amos, Hingham.
Bates, Caleb, Kingston.
Beal, Leander, Boston.
Beckford, Daniel R., Jr., Dedham.
Beebe, Franklin H., Boston.
Bell, Joseph H., Quincy.
Berry, James, Brookline.
Birchard, Charles, Framingham.
Black, James W., Cambridge.
Blake, Arthur W., Brookline.
Blakemore, John E., Roslindale.
Blanchard, John W., Dorchester.
Blaney, Henry, Salem.
Blinn, Richard D., Chicago, Ill.
Bliss, William, Boston.
Bocher, Prof. Ferdinand, Cambridge.
Bockus, Charles E., Dorchester.
Bond, George W., Jamaica Plain.
Botume, John, Wyoming.
Bouvé, Thomas T., Boston.

Bowditch, Azell C., Somerville.
Bowditch, Charles P., Jamaica Plain.
Bowditch, William E., Roxbury.
Bowker, William H., Boston.
Brackett, Cephas H., Brighton.
Brackett, Charles N., Newton.
Bresee, Albert, Hubbardton, Vt.
Brewer, Francis W., Hingham.
Brewer, John Reed, Boston.
†Brigham, William T., Boston.
Brimmer, Martin, Boston.
Brintnall, Benjamin, Charlestown.
Brooks, Francis, West Medford.
Brooks, J. Henry, Milton.
Brown, Alfred S., Jamaica Plain.
Brown, Charles E., Yarmouth, N. S.
Brown, Edward J., Weston.
Brown, George Barnard, Boston.
Brown, George Bruce, Framingham.
Brown, Jacob, Woburn.
Brownell, E. S., Essex Junction, Vt.
Bruce, Nathaniel F., Billerica.
Bullard, John R., Dedham.
Bullard, William S., Boston.
Burnett, Joseph, Southborough.
Burnham, Thomas O. H. P., Boston.
Burr, Fearing, Hingham.
Burr, Matthew H., Hingham.
Buswell, Edwin W., Brooklyn, N. Y.
Buswell, Frank E., Brooklyn, N. Y.
Butler, Aaron, Wakefield.
Butler, Edward K., Jamaica Plain.
Butterfield, William P., East Lexington.

Cabot, Edward C., Brookline.
Cadness, John, Flushing, N. Y.
Cains, William, South Boston.
Calder, Augustus P., Boston.
Capen, John, Boston.
Carlton, Samuel A., Boston.
†Carruth, Charles, Boston.
Carter, Miss Sabra, Wilmington.
Cartwright, George, Dedham.
Chadbourne, Marshall W., Mount Auburn.
Chamberlain, Chauncey W., Boston.
Chapin, Nathaniel G., Brookline.
Chase, Andrew J., Lynn.
Chase, Daniel E., Somerville.
†Chase, George B., Boston.
Chase, Hezekiah S., Boston.
Chase, William M., Baltimore, Md.
Cheney, Benjamin P., Boston.
Child, Francis J., Cambridge.
Child, William C., Medford.
Childs, Nathaniel R., Boston.
Choate, Charles F., Cambridge.
Claflin, Hon. William, Newtonville.
Clapp, Edward B., Dorchester.
Clapp, Hon. Eugene H., Roxbury.
Clapp, James H., Dorchester.
Clapp, William C., Dorchester.
Clark, Benjamin C., Boston.
Clark, J. Warren, Rockville.
†Clark, Orus, Boston.
Clarke, Miss Cora H., Jamaica Plain.
Clay, Henry, Dorchester.
Cleary, Lawrence, West Roxbury.
Clement, Asa, Dracut.
Cobb, Albert A., Brookline.
Coburn, Isaac E., Everett.
Codman, Henry Sargent, Brookline.
Codman, James M., Brookline.
Codman, Ogden, Lincoln.
Coffin, G. Winthrop, West Roxbury.
Coffin, William E., Dorchester.
Collamore, Miss Helen, Boston.
Converse, Elisha S., Malden.
Converse, Parker L., Woburn.
Coolidge, Joshua, Mount Auburn.
Copeland, Franklin, West Dedham.
Cowing, Walter H., West Roxbury.
Coy, Samuel I., Boston.
Crosby, George E., West Medford.
Crowell, Randall H., Chelsea.
Crowninshield, Benjamin W., Boston.
Cummings, John, Woburn.
Curtis, Charles F., Jamaica Plain.
Curtis, George S., Jamaica Plain.
Cushing, Robert M., Boston.

†Daggett, Henry C., Boston.
Damon, Samuel G., Arlington.

Dana, Charles B., Wellesley.
Davenport, Edward, Dorchester.
Davenport, George E., Medford.
Davenport, Henry, Boston.
Dawson, Jackson, Jamaica Plain.
Day, William F., Roxbury.
Dee, Thomas W., Mount Auburn.
Denny, Clarence H., Boston.
Denton, Eben, Dorchester.
Dewson, Francis A., Newtonville.
Dexter, F. Gordon, Boston.
Dickerman, George H., Somerville.
Dike, Charles C., Stoneham.
Dorr, George, Dorchester.
Dove, George W. W., Andover.
Durant, William, Boston.
Durfee, George B., Fall River.
Dutcher, F. J., Hopedale.

Eaton, Horace, Cambridge.
Eldridge, E. H., Roxbury.
Ellicott, Joseph P., Boston.
Elliott, Mrs. John W., Boston.
Elliott, William H., Brighton.
Endicott, William E., Canton.
Eustis, William C., Hyde Park.
Everett, William, Dorchester.
Ewell, Warren, Dorchester.

Fairchild, Charles, Boston.
Falconer, William, Glencove, N. Y.
Farlow, Lewis H., Newton.
Farquhar, James F. M., Roslindale.
Farquhar, Robert, Boston.
Faxon, John, Quincy.
Fenno, J. Brooks, Boston.
Fewkes, Arthur H., Newton Highlands.
Fisher, David, Montvale.
Fisher, James, Roxbury.
Fisher, Warren, Boston.
Flagg, Augustus, Boston.
Fleming, Edwin, West Newton.
Fletcher, George V., Belmont.
Fletcher, J. Henry, Belmont.
Fletcher, John W., Chelsea.
Flint, David B., Watertown.
Flynt, William N., Monson.
Forster, Edward J., M. D., Boston.
Foster, Francis C., Cambridge.
Fottler, John, Jr., Dorchester.
Fowle, George W., Jamaica Plain.
Fowle, William B., Auburndale.
French, Jonathan, Boston.
French, J. D. Williams, Boston.

Galloupe, Charles W., Swampscott.
Galvin, John, West Roxbury.
†Gardner, Henry N., Mount Auburn.
Gardner, John L., Brookline.
Gibbs, Wolcott, M.D., Newport, R. I.
Gill, George B., Medford.
Gillard, William, Atlantic.
Gilmore, E. W., North Easton.
Gilson, F. Howard, Reading.
Glover, Albert, Boston.
Glover, Joseph B., Boston.
Goddard, A. Warren, Brookline.
Goddard, Joseph, Roxbury.
Goddard, Mrs. Mary T., Newton.
Goodell, L. W., Dwight.
Gorham, James L., Jamaica Plain.
†Gould, Samuel, Boston.
Gray, James, Wellesley.
Gregory, James J. H., Marblehead.
Greig, George, Toronto, Ontario.
Grey, Benjamin, Malden.
Guild, J. Anson, Brookline.

Hadwen, Obadiah B., Worcester.
Hall, Edwin A., Cambridgeport.
Hall, George A., Chelsea.
Hall, George R., Fort George, Fla.
†Hall, John R., Roxbury.
Hall, Lewis, Cambridge.
Hall, Stephen A., Revere.
Hall, William F., Brookline.
Halliday, William H., South Boston.
Hammond, Gardiner G., New London, Conn.

Hammond, George W., Boston.
Hammond, Samuel, Boston.
Hanson, P. G., Woburn.
Harding, Charles L., Cambridge.
†Harding, George W., Arlington.
Harding, Louis B., Stamford, Ct.
Hardy, F. D., Jr., Cambridgeport.
Harrington, Nathan D., Somerville.
Harris, Charles, Cambridge.
Harris, Thaddeus William, A.M., Cambridge.
Hart, William T., Boston.
Hastings, Levi W., Brookline.
Hathaway, Seth W., Marblehead.
Hawken, Mrs. Thomas, Salem.
Hayes, Daniel F., Exeter, N. H.
Hayes, Francis Brown, Lexington.
†Hazeltine, Hazen, Boston.
Hemenway, Augustus, Canton.
Henshaw, Joseph P. B., Boston.
Heywood, George, Concord.
Hilbourn, A. J., Boston.
Hill, John, Stoneham.
Hitchings, E. H., Malden.
Hittinger, Jacob, Belmont.
Hoar, Samuel, Concord.
Hodgkins, John E., Boston.
Hollis, George W., Grantville.
Hollis, John W., Allston.
Holt, Mrs. Stephen A., Winchester.
Hooper, Thomas, Bridgewater.
Horner, Mrs. Charlotte N. S., Georgetown.
Horsford, Miss Kate, Cambridge.
Hovey, Charles H., East Pasadena, Cal.
Hovey, John C., Cambridgeport.
Hovey, Stillman S., Woburn.
Hubbard, Charles T., Weston.
Hubbard, Gardner G., Cambridge.
Hubbard, James C., Everett.
Humphrey, George W., Dedham.
Hunnewell, Arthur, Wellesley.
Hunnewell, H. Hollis, Wellesley.
Hunnewell, Walter, Wellesley.
Hunt, Franklin, Boston.
Hunt, William H., Concord.
Hyde, James F. C., Newton Highlands.

Jackson, Charles L., Cambridge.
Jackson, Robert T., Dorchester.
Janvrin, William S., Revere.
Jeffries, John, Boston.
Jenks, Charles W., Boston.
Johnson, J. Frank, Boston.
Jose, Edwin H., Cambridgeport.
Joyce, Mrs. E. S., Medford.

Kakas, Edward, West Medford.
Kelly, George B., Jamaica Plain.
Kendall, D. S., Woodstock, Ont.
Kendall, Edward, Cambridgeport.
Kendall, Joseph R., San Francisco, Cal.
Kendrick, Mrs. H. P., Allston.
Kennard, Charles W., Boston.
Kennedy, George G., M.D., Milton.
†Kent, John, Charlestown.
†Keyes, E. W., Denver, Col.
Keyes, George, Concord.
Kidder, Charles A., Boston.
Kidder, Nathaniel T., Milton.
†Kimball, A. P., Boston.
King, Franklin, Dorchester.
Kingman, Abner A., Brookline.
Kingman, C. D., Middleborough.
Kinney, John M., East Wareham.

Lancaster, Charles B., Newton.
Lane, John, East Bridgewater.
Lawrence, James, Groton.
†Lawrence, John, Boston.
Learned, Charles A., Arlington.
Lee, Charles J., Dorchester.
Lee, Henry, Boston.
Leeson, Joseph R., Newton Centre.
Lemme, Frederick, North Cambridge.
Leuchars, Robert B., Boston.
Lewis, A. S., Framingham.
Lewis, William G., Framingham.
Lincoln, George, Hingham.
Lincoln, Col. Solomon, Boston.

Little, James L., Jr., Brookline.
Locke, William H., Belmont.
Lockwood, Rhodes, Boston.
†Loftus, John P., North Easton.
Lord, George C., Newton.
Loring, Caleb W., Beverly Farms.
Loring, George B., Salem.
Lovett, George L., West Newton.
†Lowder, John, Watertown.
Lowell, Augustus, Boston.
Luke, Elijah H., Cambridgeport.
Lumb, William, Boston.
Lyman, Theodore, Brookline.
Lyon, Henry, Charlestown.

†Mahoney, John, Boston.
Mann, James F., Ipswich.
Mann, Jonathan, Readville.
Manning, Jacob W., Reading.
Manning, Mrs. Lydia B., Reading.
Manning, Robert, Salem.
Manning, Warren H., Brookline.
Marshall, Frederick F., Chelsea.
Martin, John S., Roxbury.
Matthews, Nathan, Boston.
McCarty, Timothy, Providence, R. I.
McClure, John, Revere.
McWilliam, George, Whitinsville.
Melvin, James C., West Newton.
Merriam, Herbert, Weston.
Merriam, M. H., Lexington.
Merrifield, William T., Worcester.
Merrill, Hon. Moody, Roxbury.
Metivier, James, Cambridge.
Milmore, Mrs. Joseph, Newton Lower Falls.
Minton, James, Boston.
Moore, John H., Concord.
Morrill, Joseph, Jr., Roxbury.
†Morse, Samuel F., Boston.
Morse, William A., Charlestown.
Motley, Thomas, Jamaica Plain.
Mudge, George A., Portsmouth, N. H.
†Munroe, Otis, Boston.

Needham, Daniel, Groton.
Nevins, David, Framingham.
Newman, John R., Winchester.
Newton, Rev. William W., Pittsfield.
Nickerson, Albert W., Marion.
Nickerson, George A., Dedham.
Norton, Charles W., Allston.
Nourse, Benjamin F., Boston.

Oakman, Hiram A., North Marshfield.
†Osgood, James Ripley, Boston.

Packer, Charles H., Boston.
Paige, Clifton H., Boston.
Palmer, Julius A., Jr., Boston.
Park, William T., Boston.
Parker, Augustus, Roxbury.
Parkman, Francis, Jamaica Plain.
Partridge, Horace, North Cambridge.
Paul, Alfred W., Dighton.
Peabody, John E., Boston.
Peabody, Col. Oliver W., Milton.
Pearce, John, West Roxbury.
Peck, Lucius T., Dorchester.
Peck, O. H., Denver, Col.
Peck, William G., Arlington.
Peirce, Silas, Boston.
Penniman, A. P., Waltham.
Perkins, Augustus T., Boston.
Perkins, Edward N., Jamaica Plain.
Perkins, William P., Wayland.
†Perry, George W., Malden.
Philbrick, William D., Newton Centre.
Pierce, Dean, Brookline.
Pierce, Henry L., Boston.
Pierce, Samuel B., Dorchester.
Poor, John R., Boston.
Porter, Herbert, Malden.
Potter, Joseph S., Arlington.
Prang, Louis, Roxbury.
Pratt, Laban, Dorchester.
Pratt, Lucius G., West Newton.
Pratt, Robert M., Boston.
Pratt, William, Winchester.
Pray, Mark W., Boston.
†Prescott, Eben C., Boston.
†Prescott, William G., Boston.
Prescott, William G., Quincy.

Pringle, Cyrus G., Charlotte, Vt.
Proctor, Thomas P., Jamaica Plain.
Prouty, Gardner, Littleton.
Putnam, Joshua H., Brookline.

Quimby, Hosea M., M.D., Worcester.

Rand, Miss Elizabeth L., Newton Highlands.
Rand, Harry S., North Cambridge.
Rand, Oliver J., Cambridgeport.
Rawson, Warren W., Arlington.
Ray, James F., Franklin.
Ray, James P., Franklin.
Ray, Joseph G., Franklin.
Raymond, Walter, Cambridgeport.
Reed, George W., Boston.
Rice, George C., Worcester.
Richards, John J., Boston.
Richardson, Charles E., Cambridge.
Rinn, J. Ph., Boston.
Ripley, Charles, Dorchester.
Robbins, I. Gilbert, Wakefield.
†Robeson, William R., Boston.
Robinson, John, Salem.
Robinson, Joseph B., Allston.
Ross, Henry, Newtonville.
Ross, M. Denman, Forest Hills.
Ross, Waldo O., Boston.
Ruddick, William H., M.D., South Boston.
Russell, George, Woburn.
Russell, Hon. John E., Leicester.
Russell, Walter, Arlington.

†Sampson, George R., London, England.
Sanford, Oliver S., Hyde Park.
Sargent, Charles S., Brookline.
Sargent, John O., Lenox.
Saville, Richard L., Brookline.
Sawtelle, Eli A., Boston.
Sawyer, Timothy T., Charlestown.
†Scott, Charles, Newton.
Scudder, Charles W., Brookline.
Sears, J. Montgomery, Boston.
Seaver, Nathaniel, East Boston.
Shaw, Christopher C., Milford, N. H.
Shimmin, Charles F., Boston.
Shorey, John L., Lynn.
Skinner, Francis, Boston.
Smith, Benjamin G., Cambridge.
Smith, Calvin W., Grantville.
Smith, Charles H., Jamaica Plain.
Smith, Charles S., Lincoln.
Smith, Chauncey, Cambridge.
Smith, Edward N., San Francisco.
Smith, George O., Boston.
Smith, James H., Dedham.
Smith, Thomas Page, Waltham.
Snow, Eben, Cambridge.
Snow, Miss Salome H., Brunswick, Me.
Spaulding, Edward, West Newton.
Speare, Alden, Newton Centre.
Springall, George, Malden.
Stetson, Nahum, Bridgewater.
Stewart, William J., Winchester.
Stickney, Rufus B., Somerville.
Stone, Amos, Charlestown.
Stone, Charles W., Boston.
Stone, George F., Chestnut Hill.
Stone, Phineas J., Charlestown.
Strong, William C., Waban.
Sturgis, Russell, Manchester.
Sturtevant, E. Lewis, M.D., South Framingham.
Surette, Louis A., Concord.

Taft, John B., Cambridge.
Tarbell, George G., M.D., Boston.
Taylor, Horace B., Boston.
Temple, Felker L., Somerville.
Thurlow, Thomas C., West Newbury.
Tidd, Marshall M., Woburn.
Tilton, Stephen W., Roxbury.
Todd, John, Hingham.
Tolman, Benjamin, Concord.
†Tolman, Miss Harriet S., Boston.
Torrey, Everett, Charlestown.
Tufts, Arthur W., Roxbury.
†Turner, John M., Dorchester.
Turner, Roswell W., Dorchester.
Turner, Royal W., Randolph.

Underwood, William J., Belmont.

Vanderwoerd, Charles, Waltham.
Vinal, Miss Mary L., Somerville.

Wainwright, William L., Braintree.
Wakefield, E. H., Cambridge.
Walcott, Henry P., M.D., Cambridge.
Wales, George O., Braintree.
Walker, Edward C. R., Roxbury.
Walley, Mrs. W. P., Boston.
Walton, Daniel G., Wakefield.
Ward, Francis Jackson, Roxbury.
Ward, John, Newton Centre.
Wardwell, William H., Brookline.
Ware, Benjamin P., Clifton.
Warren, George W., Boston.
Washburn, Andrew, Hyde Park.
Waters, Edwin F., Boston.
Waters, George F., Boston.
Watson, Benjamin M., Jr., Jamaica Plain.
Watson, Thomas A., East Braintree.
Watts, Isaac, Waverly.
Webber, Aaron D., Boston.
Weld, Christopher Minot, Jamaica Plain.
Weld, George W., Newport, R. I.
Weld, Moses W., M.D., Boston.
Weld, Richard H., Boston.
Weld, William G., Boston.
West, Mrs. Maria L., Neponset.
Weston, Leonard W., Lincoln.
Weston, Seth, Revere.
Wheeler, Frank, Concord.
Wheelwright, A. C., Brookline.
Whitcomb, William B., Medford.
White, Edward A., Boston.
White, Francis A., Brookline.
White, Joseph H., Brookline.
†Whitely, Edward, Cambridgeport.
Whitten, Charles V., Dorchester.
†Whytal, Thomas G., New York, N.Y.
Wilbur, George B., West Newton.
Wilder, Edward Baker, Dorchester.
Wilder, Henry A., Malden.
Willard, E. W., Newport, R. I.
Willcutt, Levi L., West Roxbury.
Williams, Aaron D., Boston.
Williams, Benjamin B., Boston.
Williams, Philander, Taunton.
Willis, George W., Chelsea.
Willis, Joshua C., Roxbury.
Wilson, Col. Henry W., Boston.
Wilson, William Power, Boston.
Winthrop, Robert C., Jr., Boston.
Wood, Charles G., Boston.
Wood, Luke H., Marlborough.
Wood, R. W., M.D., Jamaica Plain.
Wood, William K., West Newton.
Woods, Henry, Boston.
Woodward, Royal, Brookline.
Wright, George C., West Acton.
Wyman, Oliver B., Shrewsbury.

ANNUAL MEMBERS.

Members of the Society and all other persons who may know of deaths, changes of residence, or other circumstances showing that the following list is inaccurate in any particular, will confer a favor by promptly communicating to the Secretary the needed corrections.

Abbot, Samuel L., M.D., Boston.
Abbott, Allen V., Boston.
Allen, Charles L., Floral Park, N. Y.
Arnold, Mrs. Anna E., Newton.
Atkinson, Charles M., Brookline.
Atkinson, Edward, Brookline.
Atkinson, William B., Newburyport.

Bacon, Augustus, Roxbury.
Badlam, William H., Dorchester.
Bard, James, Dorchester.
Barker, John G., Jamaica Plain.
Beard, Edward L., Cambridge.
Beer, Carl, Bangor, Maine.
Benedict, Washington G., Boston.
Bigelow, Arthur J., Marlborough.
Bird, John L., Dorchester.
Bliss, Benjamin K., East Bridgewater.
Bock, William A., North Cambridge.
Bolles, Matthew, Boston.
Bolles, William P., Roxbury.
Bolton, John B., Somerville.
Bowditch, E. F., Framingham.
Bowditch, James H., Brookline.
Bowker, Albert, East Boston.
Boyden, Clarence F., Taunton.
Breck, Charles H., Newton.
Breck, Charles H. B., Brighton.
Brooks, George, Brookline.
Brown, David H., West Medford.
Burley, Edward, Beverly.
Butler, Edward, Wellesley.

Carroll, James T., Chelsea.
Carter, Miss Maria E., Woburn.
Carter, Mrs. Sarah D. J., Wilmington.
Chaffin, John C., Newton.
Chase, Joseph S., Malden.
Chase, Leverett M., Roxbury.
Cheney, Amos P., Natick.
Chubbuck, Isaac Y., Roxbury.
Clapp, Henry L., Roxbury.
Clark, Joseph, Manchester.
Clark, Theodore M., Newtonville.
Collins, Frank S., Malden.
Comley, James, Lexington.
Coolidge, David H., Jr., Boston.
Crafts, William A., Boston.
Crosby, J. Allen, Jamaica Plain.
Curtis, Joseph H., Boston.

Davenport, Albert M., Watertown.
Davis, Frederick, Saxonville.
Davis, Frederick S., West Roxbury.
Davis, Thomas M., Cambridgeport.
De Mar, John A., Brighton.
Dolbear, Mrs. Alice J., College Hill.
Doliber, Thomas, Brookline.
Doran, Enoch E., Brookline.
Doyle, William E., East Cambridge.
Duffley, Daniel, Brookline.

Eaton, Jacob, Cambridgeport.
Endicott, Miss Charlotte M., Canton.

Faxon, Edwin, Jamaica Plain.
Faxon, Marshall B., Boston.
Felton, Arthur W., West Newton.
Fenno, Warren, Revere.
Fisher, Sewall, Framingham.
Forbes, William H., Jamaica Plain.
Foster, Joshua T., Medford.
Frohock, Roscoe R., Malden.
Frost, Artemas, Belmont.
Frost, George, West Newton.
Frost, Varnum, Belmont.
Frost, Warren S., Belmont.
Fuller, T. Otis, Needham.

Gibbon, Mrs. James A., Brookline.
Gilbert, Samuel, Boston.
Gill, Mrs. E. M., Medford.
Gleason, Herbert, Malden.
Goddard, Thomas, Boston.
Grant, Charles E., Concord.
Guerineau, Louis, Cambridge.

Haile, Hon. William H., Springfield.
Hall, Charles H., M.D., Boston.
Hall, Stacy, Boston.
Hall, William T., Revere.
Hamlin, Delwin A., Allston.
Hanks, Mrs. C. Stedman, Boston.
Hargraves, William J., Jamaica Plain.
Harris, Miss Ellen M., Jamaica Plain.
Harris, Frederick L., Wellesley.
Hartwell, Samuel, Lincoln.
Harwood, George S., Newton.
Hersey, Alfred H., Hingham.
Hersey, Edmund, Hingham.
Hews, Albert H., North Cambridge.
Hill, Benjamin D., Peabody.
Hill, Edwin S., Clarendon Hills.
Hill, J. Willard, Belmont.
Hobbs, George M., Boston.
Hollis, George, South Weymouth.
Houghton, George S., Auburndale.
Hunt, Henry C., Newton.
Huston, Miss Katharine W., Roxbury.

Jameson, G. W., East Lexington.
Jordan, Hon. Jediah P., Roxbury.

Kendall, Jonas, Framingham.
Kenrick, Miss Anna C., Newton.
Kidder, Francis H., Medford.

Lamprell, Simon, Marblehead.
Lancaster, Mrs. E. M., Roxbury.
Langmaid, Mrs. Mary, Somerville.
Lawrence, Henry S., Roxbury.
Lawrence, Sidney, East Lexington.
Lee, Francis H., Salem.
Lombard, Richard T., Jamaica Plain.
Loring, Charles G., Boston.
Loring, John A., North Andover.
Lothrop, David W., West Medford.
Lothrop, Thornton K., Boston.
Loud, Mrs. Mary E., Chelsea.
Lougee, Miss Susan C., Roxbury.
Low, Hon. Aaron, Essex.
Lowell, John, Newton.
Lunt, William W., Hingham.

Manda, W. A., Short Hills, N. J.
Manning, A. Chandler, Reading.
Manning, J. Woodward, Reading.
Markoe, George F. H., Roxbury.
Martin, William J., Milton.
Maxwell, Charles E., Boston.
May, F. W. G., Boston.
McDermott, Andrew, Roxbury.
McIntosh, Aaron S., Roxbury.
McLaren, Anthony, Forest Hills.
Meriam, Horatio C., D.M.D., Salem.
Merrill, John Jay, Roxbury.
Merrill, Capt. S. A., Wollaston Heights.
Muzzey, Rev. Artemas B., Cambridge.

Nightingale, Rev. Crawford, Dorchester.
Norton, Michael H., Boston.
Norton, Patrick, Boston.

Olmsted, Frederick Law, Brookline.

Park, William D., Boston.
Parker, George A., Halifax.
Parker, John, Medford.
Peirce, George H., Concord.
Peirce, Herbert H. D., Cambridge.
Petremant, Robert, Dorchester.
Pitcher, James R., Short Hills, N. J.
Plimpton, Willard P., West Newton.
Power, Charles J., South Framingham.
Prichard, Joseph V., Boston.
Purdie, George A., Wellesley Hills.
Putnam, Charles A., Salem.

Randall, Macey, Stoughton.
Rich, William E. C., Roxbury.
Rich, William P., Chelsea.
Richards, Mrs. P. D., West Medford.
Richardson, Horace, M.D., Boston.
Robbins, Oliver R., Weston.
Robinson, William, North Easton.
Ross, Charles W., Newtonville.

Safford, Nathaniel F., Milton.
Saunders, Miss Mary T., Salem.
Sawtell, J. M., Fitchburg.
Schmitt, George A., Boston.
Scott, Augustus E., Lexington.
Scudder, Samuel H., Cambridge.
Seaver, Edwin P., LL.D., Newton Highlands.
Sharples, Stephen P., Cambridge.
Shattuck, Frederick R., Roxbury.
Shedd, Abraham B., Waltham.
Sheppard, Edwin, Lowell.
Snow, Eugene A., Melrose.
Snow, Francis B., Dorchester.
Southworth, Edward, Quincy.
Spencer, Aaron W., Boston.
Spooner, William H., Jamaica Plain.
Squire, Miss Esther A., North Cambridge.
Squire, John P., Arlington.
Stearns, Mrs. Charles A., East Watertown.
Stearns, Charles H., Brookline.
Stone, Samuel G., Charlestown.
Storer, Charles, Natick.
Story, Miss Sarah W., Brighton.
Swan, Charles W., M.D., Boston.

Tailby, Joseph, Wellesley.
Talbot, Josiah W., Norwood.
Teel, William H., West Acton.
Terry, Rev. Calvin, North Weymouth.
Tobey, S. Edwin, Boston.
Torrey, Bradford, Boston.
Tousey, Prof. William G., College Hill.
Turner, Nathaniel W., Boston.

Vaughan, J. C., Chicago, Ill.

Walker, William P., Somerville.
Way, John M., Roxbury.
Welch, Patrick, Dorchester.
Wellington, Miss Caroline, East Lexington.
Wells, Benjamin T., Newton.
Weston, Mrs. L. P., Danvers.
Wheatland, Henry, M.D., Salem.
Wheeler, James, Brookline.
White, George A., Roxbury.
White, W. Henry, Lowell.
Whitney, Joel, Winchester.
Whiton, Starkes, Hingham Centre.
Whittier, Hon. Charles, Roxbury.
Wilcox, George D., M.D., Providence, R. I.
Wilmarth, Henry D., Jamaica Plain.
Wilson, B. Osgood, Watertown.
Wilson, George W., Malden.
Winter, William C., Mansfield.
Wolcott, Mrs. Henrietta L. T., Dedham.
Wood, Mrs. Anna D., West Newton.
Wood, E. W., West Newton.
Woodford, Joseph H., Boston.
Worthington, Roland, Roxbury.

Young, E. Bentley, Boston.

Zirngiebel, Denys, Needham.

EXTRACTS FROM THE CONSTITUTION AND BY-LAWS.

SECTION XXVI. — Life Members.

The payment of thirty dollars shall constitute a Life Membership, and exempt the member from all future assessments; and any member having once paid an admission fee may become a Life Member by the payment of twenty dollars in addition thereto.

SECTION XXVII. — Admission Fee and Annual Assessment.

Every subscription member, before he receives his diploma, or exercises the privileges of a member, shall pay the sum of ten dollars as an admission fee, and shall be subject afterwards to an annual assessment of two dollars.

SECTION XXIX. — Discontinuance of Membership.

Any member who shall neglect for the space of two years to pay his annual ssessment shall cease to be a member of the Society, and the Treasurer shall erase his name from the List of Members. Any member may withdraw from the Society, on giving notice to the Treasurer and paying the amount due from him to the Society.

The attention of Annual Members is particularly called to Section XXIX.

HONORARY MEMBERS.

Members and correspondents of the Society and all other persons who may know of deaths, changes of residence, or other circumstances showing that the following list is inaccurate in any particular, will confer a favor by promptly communicating to the Secretary the needed corrections.

Information, or any clew to it, is especially desired in regard to Joseph Maxwell, *elected in* 1830, *and* George W. Smith, *elected in* 1851. *The names of those known to be deceased are marked with a star.*

*Benjamin Abbott, LL.D., Exeter, N. H.

*John Abbott, Brunswick, Me.

*Hon. John Quincy Adams, LL.D., late President of the United States, Quincy.

*Professor Louis Agassiz, Cambridge.

*William T. Aiton, late Curator of the Royal Gardens, Kew, England.

*Thomas Allen, late President of the St. Louis Horticultural Society, St. Louis, Mo., and Pittsfield, Mass.

*Hon. Samuel Appleton, Boston.

*Hon. James Arnold, New Bedford.

*Edward Nathaniel Bancroft, M.D., late President of the Horticultural and Agricultural Society of Jamaica.

*Hon. Philip P. Barbour, Virginia.

*Don Angel Calderon de la Barca, late Spanish Minister at Washington.

*Robert Barclay, Bury Hill, Dorking, Surrey, England.

*James Beekman, New York.

*L'Abbé Berlèse, Paris.

*Nicholas Biddle, Philadelphia.

*Dr. Jacob Bigelow, Boston.

*Mrs. Lucy Bigelow, Medford.

*Le Chevalier Soulange Bodin, late Secrétaire Général de la Société d'Horticulture de Paris.

Hon. George S. Boutwell, Groton.

*Josiah Bradlee, Boston.

*Hon. George N. Briggs, Pittsfield.

*Hon. James Buchanan, late President of the United States, Lancaster, Pa.

*Hon. Jesse Buel, late President of the Albany Horticultural Society, Albany, N. Y.
*Hon. Edmund Burke, late Commissioner of Patents, Washington, D. C.
*Augustin Pyramus de Candolle, Geneva, Switzerland.
*Hon. Horace Capron, late U. S. Commissioner of Agriculture, Washington, D. C.
*Commodore Isaac Chauncey, U. S. Navy, Brooklyn, N. Y.
*Ward Chipman, late Chief Justice of New Brunswick, St. John.
*Lewis Clapier, Philadelphia.
*Hon. Henry Clay, Lexington, Ky.
H. W. S. Cleveland, Minneapolis, Minn.
*Admiral Sir Isaac Coffin, Bart., England.
*Zaccheus Collins, late President of the Pennsylvania Horticultural Society, Philadelphia.
*Roswell L. Colt, Paterson, N. J.
*Caleb Cope, late President of the Pennsylvania Horticultural Society, Philadelphia.
*William Coxe, Burlington, N. J.
*John P. Cushing, Watertown.
*Charles W. Dabney, late U. S. Consul, Fayal, Azores.
*Hon. John Davis, LL.D., Boston.
*Sir Humphry Davy, London.
*Gen. Henry Alexander Scammel Dearborn, Roxbury.
*James Dickson, late Vice-President of the Horticultural Society of London.
*Mrs. Dorothy Dix, Boston.
*Capt. Jesse D. Elliot, U. S. Navy.
*Hon. Stephen Elliot, LL.D., Charleston, S. C.
*Hon. Henry L. Ellsworth, late Commissioner of Patents, Washington, D. C.
*Allyn Charles Evanson, late Secretary of the King's County Agricultural Society, St. John, N. B.
*Hon. Edward Everett, LL.D., Boston.
*Hon. Horace Everett, Vermont.
*F. Faldermann, late Curator of the Imperial Botanic Garden, St. Petersburg.
*Hon. Millard Fillmore, late President of the United States, Buffalo, N. Y.
*Dr. F. E. Fischer, late Professor of Botany at the Imperial Botanic Garden, St. Petersburg, Russia.
*Hon. Theodore Frelinghuysen, late President of the American Agricultural Society, New Brunswick, N. J.
*Joseph Gales, Jr., late Vice-President of the Horticultural Society, Washington, D. C.
*George Gibbs, New York.
*Stephen Girard, Philadelphia.
*Hon. Robert T. Goldsborough, Talbot County, Md.
*Ephraim Goodale, South Orrington, Me.

*Mrs. Rebecca Gore, Waltham.
*Hon. John Greig, late President of the Domestic Horticultural Society, Canandaigua, N. Y.
*Mrs. Mary Griffith, Charlieshope, N. J.
*Gen. William Henry Harrison, late President of the United States, North Bend, O.
*S. P. Hildreth, M.D., Marietta, O.
*Thomas Hopkirk, late President of the Glasgow Horticultural Society.
*David Hosack, M.D., late President of the New York Horticultural Society.
*Lewis Hunt, Huntsburg, O.
*Joseph R. Ingersoll, late President of the Pennsylvania Horticultural Society, Philadelphia.
*Gen. Andrew Jackson, late President of the United States, Nashville, Tenn.
*Mrs. Martha Johonnot, Salem.
*Jared Potter Kirtland, M.D., LL.D., East Rockport, O.
*Thomas Andrew Knight, late President of the Horticultural Society of London.
*Gen. La Fayette, La Grange, France.
*Le Comte de Lasteyrie, late Vice-President of the Horticultural Society of Paris.
Major L. A. Huguet-Latour, M. P., Montreal, Can.
*Baron Justus Liebig, Giessen, Germany.
*Professor John Lindley, late Secretary of the Royal Horticultural Society, London.
*Franklin Litchfield, late U. S. Consul at Puerto Cabello, Venezuela.
*Joshua Longstreth, Philadelphia.
*Nicholas Longworth, Cincinnati, O.
*Jacob Lorillard, late President of the New York Horticultural Society.
*John Claudius Loudon, London.
*Hon. John A. Lowell, Boston.
*Baron Charles Ferdinand Henry von Ludwig, late Vice-President of the South African Literary and Scientific Institution, Cape Town, Cape of Good Hope.
*Hon. Theodore Lyman, Brookline.
Col. Theodore Lyman, Brookline.
*Hon. James Madison, late President of the United States, Montpelier, Va.
*Mrs. Charlotte Maryatt, Wimbledon, near London.
Joseph Maxwell, Rio Janeiro.
*D. Smith McCauley, late U. S. Consul-General at Tripoli, Philadelphia.
*Hon. Isaac McKim, late President of the Horticultural Society of Maryland, Baltimore.
Rev. James H. Means, Dorchester.
*James Mease, M.D., Philadelphia.
*Lewis John Mentens, Brussels, Belgium.
*Hon. Charles F. Mercer, Virginia.

*François André Michaux, Paris.
Donald G. Mitchell, New Haven, Conn.
*Samuel L. Mitchill, M.D., LL.D., New York.
*Hon. James Monroe, late President of the United States, Oak Hill, Va.
*Alfred S. Monson, M.D., late President of the New Haven Horticultural Society, New Haven, Conn.
*Hon. A. N. Morin, Montreal, Can.
*Théodore Mosselmann, Antwerp, Belgium.
Baron R. Von Osten Sacken, Heidelberg, Germany.
*Baron Ottenfels, late Austrian Minister to the Ottoman Porte.
*John Palmer, Calcutta.
*Hon. Joel Parker, LL.D., Cambridge.
Samuel B. Parsons, Flushing, N. Y.
*Hon. Thomas H. Perkins, Brookline.
*Antoine Poiteau, late Professor in the Institut Horticole de Fromont.
*Hon. James K. Polk, late President of the United States, Nashville, Tenn.
*John Hare Powel, Powelton, Pa.
*Henry Pratt, Philadelphia.
*William Prince, Flushing, N. Y.
*Rev. George Putnam, D.D., Roxbury.
*Col. Joel Rathbone, late President of the Albany and Rensselaer Horticultural Society, Albany, N. Y.
*Archibald John, Earl of Rosebery, late President of the Caledonian Horticultural Society.
*Joseph Sabine, late Secretary of the Horticultural Society of London.
*Don Ramon de la Sagra, Havana, Cuba.
*Henry Winthrop Sargent, Fishkill, N. Y.
*Sir Walter Scott, Abbotsford, Scotland.
*John Shepherd, late Curator of the Botanic Garden, Liverpool, England.
*John S. Skinner, late Editor of the American Farmer, Baltimore, Md.
George W. Smith, Boston.
*Stephen H. Smith, late President of the Rhode Island Horticultural Society.
*Hon. Charles Sumner, Boston.
*Hon. John Taliaferro, Virginia.
*Gen. James Talmadge, late President of the American Institute, New York.
*Gen. Zachary Taylor, late President of the United States, Baton Rouge, La.
*James Thacher, M. D., Plymouth.
John J. Thomas, Union Springs, N.Y.
*James W. Thompson, M.D., Wilmington, Del.
*Grant Thorburn, New York.
*M. Du Petit Thouars, Paris.
*Le Vicomte Héricart De Thury, late President of the Horticultural Society of Paris.

*Mons. Tougard, late President of the Horticultural Society of Rouen, France.
*Gen. Nathan Towson, late President of the Horticultural Society, Washington, D. C.
*Hon. John Tyler, late President of the United States, Williamsburg, Va.
*Rev. Joseph Tyso, Wallingford, England.
*Hon. Martin Van Buren, late President of the United States, Kinderhook, N. Y.
*Federal Vanderburg, M.D., New York.
*Jean Baptiste Van Mons, M.D., Brussels, Belgium.
*Gen. Stephen Van Rensselaer, Albany, N. Y.
*Joseph R. Van Zandt, Albany, N. Y.
*Benjamin Vaughan, M.D., Hallowell, Me.
*Petty Vaughan, London.
*Rev. N. Villeneuve, Montreal, Can.
*Pierre Philippe André Vilmorin, Paris.
*James Wadsworth, Geneseo, N. Y.
*Nathaniel Wallich, M.D., late Curator of the Botanic Garden, Calcutta.
*Malthus A. Ward, M.D., late Professor in Franklin College, Athens, Ga.
*Hon. Daniel Webster, Marshfield.
*Hon. John Welles, Boston.
*Jeremiah Wilkinson, Cumberland, R. I.
Hon. Robert C. Winthrop, Boston.
*Frederick Wolcott, Litchfield, Conn.
*Ashton Yates, Liverpool, England.
*Lawrence Young, late President of the Kentucky Horticultural Society, Louisville.

CORRESPONDING MEMBERS.

Members and correspondents of the Society and all other persons who may know of deaths, changes of residence, or other circumstances showing that the following list is inaccurate in any particular, will confer a favor by promptly reporting to the Secretary the needed corrections.

Information, or any clew to it, is especially desired in regard to Alexander Burton, *elected in* 1829, S. Reynolds, M.D., 1832, *and* Francis Summerest, 1833. *The names of those known to be deceased are marked with a star.*

*John Adlum, Georgetown, D. C.

*Don Francisco Aguilar y Leal, late U. S. Vice-Consul at Maldonado, Banda Oriental del Uruguay.

*Mons. Alfroy, Lieusaint, France.

*James T. Allan, late President of the Nebraska State Horticultural Society, Omaha.

A. B. Allen, New York.

*Rev. Thomas D. Anderson, D.D., South Boston.

Édouard André, Redacteur en chef de la Revue Horticole, Paris, France.

*Thomas Appleton, late U. S. Consul at Leghorn, Italy.

*Col. Thomas Aspinwall, late U. S. Consul at London, Brookline.

P. M. Augur, State Pomologist, Middlefield, Conn.

Professor L. H. Bailey, Jr., Cornell University, Ithaca, N. Y.

*Isaac Cox Barnet, late U. S. Consul at Paris.

*Patrick Barry, late Vice-President of the American Pomological Society, Rochester, N. Y.

*Augustine Baumann, Bolwiller, Alsace.

*Eugéne Achille Baumann, Rahway, N. J.

*Joseph Bernard Baumann, Bolwiller, Alsace.

Napoleon Baumann, Bolwiller, Alsace.

D. W. Beadle, St. Catherine's, Ontario.

Professor William J. Beal, Lansing, Michigan.

*Noel J. Becar, Brooklyn, N. Y.

*Edward Beck, Worton College, Isleworth, near London.

*Rev. Henry Ward Beecher, Peekskill, N. Y.

*Louis Édouard Berckmans, Rome, Ga.

Prosper J. Berckmans, Augusta, Ga.

CHARLES E. BESSEY, Ph.D., Industrial College of the University of Nebraska, Lincoln.

*ALEXANDER BIVORT, late Secretary of the Société Van Mons, Fleurus, Belgium.

*TRIPET LE BLANC, Paris.

DR. CH. BOLLE, Berlin, Prussia.

*CHARLES D. BRAGDON, Pulaski, Oswego Co., N. Y.

*WILLIAM D. BRINCKLÉ, M.D., Philadelphia.

*GEORGE BROWN, late U. S. Commissioner to the Sandwich Islands, Beverly.

*JOHN W. BROWN, Fort Gaines, Ga.

*DR. NEHEMIAH BRUSH, East Florida.

*ARTHUR BRYANT, SR., late President of the Illinois State Horticultural Society, Princeton.

PROFESSOR J. L. BUDD, Secretary of the Iowa Horticultural Society, Ames.

*ROBERT BUIST, Philadelphia.

*DR. E. W. BULL, Hartford, Conn.

WILLIAM BULL, Chelsea, England.

*REV. ROBERT BURNET, Ex-President of the Ontario Fruit Growers' Association, Milton.

ALEXANDER BURTON, United States Consul at Cadiz, Spain, Philadelphia.

ISIDOR BUSH, Bushberg, Jefferson Co., Mo.

GEORGE W. CAMPBELL, President of the Ohio State Horticultural Society, Delaware, O.

*FRANCIS G. CARNES, New York.

*COL. ROBERT CARR, Philadelphia.

*REV. JOHN O. CHOULES, D.D., Newport, R. I.

*REV. HENRY COLMAN, Boston.

*JAMES COLVILL, Chelsea, England.

MAXIME CORNU, Directeur du Jardin des Plantes, Paris, France.

BENJAMIN E. COTTING, M.D., Boston.

*SAMUEL L. DANA, M.D., Lowell.

*J. DECAISNE, late Professeur de Culture au Muséum d'Histoire Naturelle, Jardin des Plantes, Paris.

*JAMES DEERING, Portland, Me.

*H. F. DICKEHUT.

*SIR C. WENTWORTH DILKE, Bart., London.

*HON. ALLEN W. DODGE, Hamilton.

REV. H. HONYWOOD D'OMBRAIN, Westwell Vicarage, Ashford, Kent, England.

ROBERT DOUGLAS, Waukegan, Ill.

*ANDREW JACKSON DOWNING, Newburg, N. Y.

*CHARLES DOWNING, Newburg, N. Y.

W. T. THISELTON DYER, C.M.G., F.R.S., Director of the Royal Botanic Gardens, Kew, England.

PARKER EARLE, President of the American Horticultural Society, Cobden, Ill.

*F. R. Elliott, late Secretary of the American Pomological Society, Cleveland, O.

George Ellwanger, Rochester, N. Y.

Henry John Elwes, F.L.S., F.Z.S., Preston Hall, Cirencester, England.

*George B. Emerson, LL.D., Winthrop.

*Ebenezer Emmons, M.D., Williamstown.

*Andrew H. Ernst, Cincinnati, O.

William G. Farlow, M.D., Professor of Cryptogamic Botany, Harvard University, Cambridge.

*Nathaniel Fellows, Cuba.

*Henry J. Finn, Newport, R. I.

*Willard C. Flagg, late Secretary of the American Pomological Society, Moro, Ill.

*Michael Floy, late Vice-President of the New York Horticultural Society, New York.

*John Fox, Washington, D. C.

*Hon. Russell Freeman, Sandwich.

Andrew S. Fuller, Ridgewood, N. J.

*Henry Weld Fuller, Roxbury.

Hon. Robert W. Furnas, President of the Nebraska State Horticultural Society, Brownville.

*Augustin Gande, late President of the Horticultural Society, Department of the Sarthe, France.

*Robert H. Gardiner, Gardiner, Me.

*Benjamin Gardner, late U. S. Consul at Palermo, Sicily.

*Capt. James T. Gerry, U. S. Navy.

*Charles Gibb, late Corresponding Secretary of the Fruit Growers' Association, Abbottsford, Quebec.

*Abraham P. Gibson, late U. S. Consul at St. Petersburg.

*R. Glendinning, Chiswick, near London.

Professor George L. Goodale, Cambridge.

Charles A. Goessmann, Ph.D., Director of the State Agricultural Experiment Station, Amherst.

*George W. Gordon, late U. S. Consul at Rio Janeiro, Boston.

*Professor Asa Gray, Cambridge.

Obadiah B. Hadwen, Ex-President of the Worcester County Horticultural Society, Worcester.

*Charles Henry Hall, New York.

*Abraham Halsey, late Corresponding Secretary of the New York Horticultural Society, New York.

*Dr. Charles C. Hamilton, late President of the Fruit Growers' Association and International Show Society of Nova Scotia, Cornwallis.

*Rev. Thaddeus Mason Harris, D.D., Dorchester.

*Thaddeus William Harris, M.D., Cambridge.

*John Hay, late Architect of the Caledonian Horticultural Society.

*Bernard Henry, late U. S. Consul at Gibraltar, Philadelphia.

DR. F. M. HEXAMER, Editor of the American Agriculturist, New Rochelle, N. Y.

*SHIRLEY HIBBERD, Editor of the Gardeners' Magazine, London.

*J. J. HITCHCOCK, Baltimore.

ROBERT HOGG, LL.D., Editor of the Journal of Horticulture, London.

*THOMAS HOGG, New York.

THOMAS HOGG, New York.

J. C. HOLDING, Ex-Treasurer and Secretary of the Cape of Good Hope Agricultural Society, Cape Town, Africa.

REV. S. REYNOLDS HOLE, Rochester, England.

SIR JOSEPH HOOKER, K.C.S.I., The Camp, Sunningdale, England.

JOSIAH HOOPES, West Chester, Pa.

PROFESSOR E. N. HORSFORD, Cambridge.

J. HOST, Superintendent of the Botanic Garden, Trinidad.

*SANFORD HOWARD, Chicago, Ill.

*DR. WILLIAM M. HOWSLEY, late President of the Kansas State Horticultural Society, Leavenworth.

*ISAAC HUNTER, Baltimore, Md.

*ISAAC HURD, Cincinnati, O.

GEORGE HUSMANN, Napa, Cal.

*PROFESSOR ISAAC W. JACKSON, Union College, Scheneetady, N. Y.

*THOMAS P. JAMES, Cambridge.

*EDWARD JARVIS, M.D., Dorchester.

JOHN W. P. JENKS, Middleborough.

WILLIAM J. JOHNSON, M.D., Fort Gaines, Ga.

CHARLES JOLY, Vice-President of the Société d'Horticulture de France, Paris.

DR. GEORGE KING, Superintendent of the Royal Botanic Garden, Calcutta.

*SAMUEL KNEELAND, M.D., Boston.

*MONS. LAFFAY, St. Cloud, near Paris, France.

*DAVID LANDRETH, late Corresponding Secretary of the Pennsylvania Horticultural Society, Bristol.

*CHARLES C. LANGDON, Mobile, Ala.

PROFESSOR WILLIAM R. LAZENBY, Secretary of the Agricultural Experiment Station, Columbus, O.

*DR. WILLIAM LEBARON, late State Entomologist, Geneva, Ill.

MAX LEICHTLIN, Baden-Baden, Germany.

G. F. B. LEIGHTON, President of the Norfolk Horticultural and Pomological Society, Norfolk, Va.

VICTOR LEMOINE, Nancy, France.

*E. S. H. LEONARD, M.D., Providence, R. I.

*ANDRÉ LEROY, Author of the Dictionnaire de Pomologie, Angers, France.

J. LINDEN, Ghent, Belgium.

*HON. GEORGE LUNT, Scituate.

T. T. LYON, President of the Michigan Horticultural Society, Grand Haven.

*F. W. MACONDRAY, San Francisco, Cal.

DR. P. MACOWAN, Director of the Botanic Garden, Cape Town, Africa.

*James J. Mapes, LL.D., Newark, N. J.
*A. Mas, late President of the Horticultural Society, Bourg-en-Bresse, France.
Dr. Maxwell T. Masters, Editor of the Gardeners' Chronicle, London.
*James Maury, late U. S. Consul at Liverpool, England.
George Maw, Benthall, Kinley, Surrey, England.
C. J. de Maximowicz, St. Petersburg, Russia.
T. C. Maxwell, Geneva, N. Y.
*William Sharp McLeay, New York.
*James McNab, late Curator of the Botanic Garden, Edinburgh, Scotland.
Thomas Meehan, Germantown, Pa.
*Allan Melvill, New York.
*John Miller, M.D., late Secretary of the Horticultural and Agricultural Society of Jamaica.
*Stephen Mills, Flushing, N. Y.
*Charles M'Intosh, Dalkeith Palace, near Edinburgh.
*Joseph E. Mitchell, late President of the Pennsylvania Horticultural Society, Philadelphia.
Dr. Charles Mohr, Mobile, Ala.
*Giuseppe Monarchini, M.D., Canea, Isle of Candia.
*Édouard Morren, Editor of the Belgique Horticole, Liège, Belgium.
D. Morris, F.L.S., Assistant Director of the Royal Botanic Gardens, Kew, England.
Ch. Naudin, Antibes, France.
*Horatio Newhall, M.D., Galena, Ill.
George Nicholson, Curator of the Royal Botanic Gardens, Kew, England.
*David W. Offley, late U. S. Consular Agent at Smyrna, Turkey.
*James Ombrosi, late U. S. Consul at Florence, Italy.
*John J. Palmer, New York.
*Victor Paquet, Paris.
*John W. Parker, late U. S. Consul at Amsterdam, Holland.
*André Parmentier, Brooklyn, N. Y.
William Paul, Waltham Cross, London, N.
*Sir Joseph Paxton, M.P., Chatsworth, England.
*John L. Payson, late U. S. Consul at Messina, Sicily.
Professor D. P. Penhallow, Director of the Botanic Garden, Montreal, Can.
*Commodore Matthew C. Perry, U. S. Navy, Charlestown.
*David Porter, late U. S. Chargé d'Affaires at the Ottoman Porte, Constantinople.
*Alfred Stratton Prince, Flushing, N. Y.
*William Robert Prince, Flushing, N. Y.
P. T. Quinn, Newark, N. J.
*Rev. W. F. Radclyffe, London, England.
*William Foster Redding, Baltimore, Md.
D. Redmond, Ocean Springs, Miss.
Dr. Edward Regel, St. Petersburg, Russia.

S. Reynolds, M.D., Schenectady, N. Y.
*John H. Richards, M.D., Illinois.
Dr. T. G. Richardson, University of Louisiana, New Orleans, La.
Charles V. Riley, Entomologist to the U. S. Department of Agriculture, Washington, D. C.
*Mons. J. Rinz, Jr., Frankfort-on-the-Main, Germany.
*Thomas Rivers, Sawbridgeworth, Herts, England.
William Robinson, Editor of The Garden, London.
*Bernhard Roeser, M.D., Bamberg, Bavaria.
*Dr. J. Smith Rogers, New York.
*Capt. William S. Rogers, U. S. Navy.
*Thomas Rotch, Philadelphia.
*George R. Russell, Roxbury.
John B. Russell, Indianapolis, Ind.
*Rev. John Lewis Russell, Salem.
William Saunders, Department of Agriculture, Washington, D. C.
*William Shaler, late U. S. Consul-General at Havana, Cuba.
*Henry Shaw, St. Louis, Mo.
*William Shaw, New York.
*Caleb R. Smith, Burlington, N. J.
*Daniel D. Smith, Burlington, N. J.
*Gideon B. Smith, late Editor of the American Farmer, Baltimore, Md.
*John Jay Smith, Germantown, Pa.
*Horatio Sprague, late U. S. Consul at Gibraltar.
Robert W. Starr, Port William, N. S.
Dr. Joseph Stayman, Leavenworth, Kan.
*Capt. Thomas Holdup Stevens, U. S. Navy, Middletown, Conn.
William A. Stiles, Editor of Garden and Forest, Deckertown, N. J.
*William Fox Strangeway, late British Secretary of Legation at Naples, Italy.
*Dr. J. Strentzel, Martinez, Cal.
*Judge E. B. Strong, Rochester, N. Y.
*James P. Sturgis, Canton, China.
William Summer, Pomaria, S. C.
Francis Summerest.
*Professor Michele Tenore, late Director of the Botanic Garden at Naples, Italy.
*James Englebert Teschemacher, Boston.
*Robert Thompson, Chiswick, near London.
*George C. Thorburn, New York.
*Professor George Thurber, Editor of the American Agriculturist, New York.
*John Tilson, Jr., Edwardsville, Ill.
*Cav. Doct. Vincenzo Tineo, late Director of the Botanic Garden at Palermo.
Dr. Melchior Treub, Director of the Botanic Garden, Buitenzorg, Java.
*Luther Tucker, late Editor of The Cultivator, Albany, N. Y.

*Carey Tyso, Wallingford, England.
*Louis Van Houtte, Ghent, Belgium.
*Alexander Vattemare, Paris.
H. J. Veitch, Chelsea, England.
Henry Vilmorin, Secrétaire de la Société Nationale d'Agriculture de France, Paris.
*Emilien de Wael, late Secretary of the Horticultural Society, Antwerp, Belgium.
*John A. Warder, M.D., late President of the Ohio State Horticultural Society, North Bend, O.
Anthony Waterer, Knapp Hill, near Woking, Surrey, England.
Sereno Watson, Ph.D., Cambridge.
*J. Ambrose Wight, late Editor of the Prairie Farmer, Chicago, Ill.
*Benjamin Samuel Williams, Upper Holloway, London, N.
*Professor John Wilson, Edinburgh University, Scotland.
*William Wilson, New York.
*Hon. J. F. Wingate, Bath, Me.
*Gen. Joshua Wingate, Portland, Me.
*Joseph Augustus Winthrop, Charleston, S. C.

CONTENTS.

TRANSACTIONS

OF THE

Massachusetts Horticultural Society,

FOR THE YEAR 1891.

PART I.

BOSTON:
PRINTED FOR THE SOCIETY.
1891.

The following papers and discussions have been circulated to some extent in the form of slips reprinted from the reports made by the Secretary of the Society in the Boston Transcript. As here presented, the papers are printed in full, and the discussions are not only much fuller than in the weekly reports, but, where it appeared necessary, have been carefully revised by the speakers.

The Committee on Publication and Discussion take this opportunity to repeat what they have before stated, that the Society is not to be held responsible for the certainty of the statements, the correctness of the opinions, or the accuracy of the nomenclature in the papers and discussions now or heretofore published, all of which must rest on the credit or judgment of the respective writers or speakers, the Society undertaking only to present these papers and discussions, or the substance of them, correctly.

O. B. Hadwen,
William H. Hunt,
Francis H. Appleton,
Committee on Publication and Discussion.

TRANSACTIONS

OF THE

Massachusetts Horticultural Society.

BUSINESS MEETING.

SATURDAY, January 3, 1891.

A duly notified stated meeting of the Society was holden at eleven o'clock, the President, WILLIAM H. SPOONER, in the chair.

This being the commencement of the term of office of the new board of officers and standing Committees, the President delivered an appropriate annual address as follows:

ADDRESS OF PRESIDENT SPOONER.

Ladies and Gentlemen of the Massachusetts Horticultural Society:—Another year has passed, and we meet to exchange friendly wishes for that which is before us, and to recall with pleasure the successes in which we have all felt so much interest during the months that have left their treasures with us. Three of our principal exhibitions were remarkably fine; that in March, of bulbs, which were of high merit, and notably the Annual Show of Plants, which, even in the sultry month of August, aroused great enthusiasm among the lovers of the beautiful, long to be remembered. The meeting of the National Society of Florists, at that time, furnished a pleasant stimulus to our efforts in this direction, and the opportunity was certainly improved to the fullest extent. The members of that Society, representing the most intelligent cultivators of the country and so strongly influencing its commercial floral industries, were visitors who added greatly to the zest of the occasion, and the Committees having all arrangements in charge deserved high praise for their untiring energy in bringing together so large a number of exhibitors with their magnificent collections

of plants. Such opportunities as this furnish a good test of our capabilities, and show what we have acquired; each member is ready to do his best, and those who visited Music Hall during the August exhibition will need no reminder of the beautiful result.

In a financial point of view, the Chrysanthemum Show in November was by far the best of its kind ever held by the Society, and fully emphasized the fact that the public appreciate a good exhibition if it presents something out of the regular course, and is not a mere repetition of its predecessors.

A gratifying improvement has been apparent also in the weekly shows of the season, many of them being of remarkable excellence and giving the best incentive to our exhibitors to keep up the standard, each one striving still further to excel.

One of our members has suggested the value of membership in our Society, and how much he has enjoyed its privileges; instead of a membership of eight hundred, we ought to have on our list twice that number. Can we not each endeavor to bring in one or more new names to the list?

I am glad to notice by the report of the Library Committee, a more general use of the books. Our privileges in this respect are extensive; we have one of the finest libraries of its kind in the world; the rooms are pleasant and convenient, and it would be advantageous to promote social interchange and increase mutual interest in this beautiful science. These privileges not being restricted to members, and the competition for prizes being open to all, the liberality of the city and of the Commonwealth towards our Society is repaid in kind.

And this leads me to emphasize the importance of the meetings for discussion, as a branch of our work which deserves more attention from members, and which ought to attract public interest also. The papers read here are from practical and scientific men, upon subjects relating to practical Horticulture and Agriculture, and they deserve fuller notice by the press, which I hope our Committee may make arrangements to insure. The Chairman of the Committee says the TRANSACTIONS will in time become an encyclopædia of practical Horticulture. The delays which have occurred in preparing these transactions have been unavoidable, owing to repairs being made in the halls and library, during 1889, necessitating frequent interruptions to our Secretary's labors.

From the report of the Committee on Window Gardening we learn that its work has been actively continued, with apparent success, showing a gain in its missionary efforts which renders it worthy of continued support; its influences tend to increased information on the subject of our art, and ultimately perhaps to an increase of our membership.

I desire to call your attention to the World's Columbian Exposition, to be held in Chicago, in 1893,—a national celebration of such magnitude that it should receive the support of all. Horticulture should be fully represented in all its branches, in a distinct department, as such an Exposition could not be complete without this beautiful feature. Its large commercial importance justly entitles it to proper representation, and I trust that our Society as one of the oldest, will take measures at an early day to secure the opportunity of showing some, at least, of the achievements of Massachusetts Horticulture.

This Society has a representation in the State Board of Agriculture, and receives its annual bounty; as the Board holds an annual meeting of several days' duration in different counties of the State it would be an appropriate act of courtesy on the part of our Society to extend an invitation to the Board to hold its next meeting in Boston, with the free use of our halls for the purpose.

During the year the Society has lost from its membership, by death:

John S. Farlow, of Newton, an amateur cultivator on his large estate, and a frequent and valued contributor to our exhibitions. Mr. Farlow left by his will, a conditional bequest to this Society.

George Hill, of Arlington, one of our strong members, a man of sterling character; an exhibitor whose products were of the finest and whose place here will not easily be filled.

Mrs. Francis B. Hayes, widow of our late President, who was a large and constant contributor to our exhibitions, continuing to encourage the pursuits in which her husband had shown so much energy.

Warren Heustis, of Belmont, even within a few days has been stricken suddenly from among us, and will be greatly missed. He has been a valuable contributor in the department of fruits and vegetables, and a most successful amateur rose cultivator.

Stiles Frost, of Newton and Hermann Grundel, of Roxbury, were also members of long standing and of undoubted ability.

Also, Dr. Henry J. Bigelow, who became a member of our Society only a few months before his death.

The vacant spaces left in our ranks admonish us that we need to train up recruits for active membership. I am more forcibly impelled to urge this by the discovery, from reference to the records of membership, that less than one-half as many persons were admitted as members of our Society during 1890, as there were in 1889. It is, therefore, noticeable that while our exhibitions have greatly advanced in merit, our members have not proportionately increased, though it should, in justice, be said that the large accession in 1889, was chiefly due to the efforts of one member.

The finances of the Society are in a prosperous condition; the stores are under favorable leases, and the halls have been in frequent demand during the year, yielding good returns with judicious management. During the past year $10,000 has been paid on the mortgage debt, leaving a balance of $15,000 to be paid, and we have in the Sinking Fund the sum of $5,000. The John Lewis Russell fund, of $1,000, is permanently invested.

No expenditures of importance have been made upon the building, but some repairs to portions of the premises need immediate attention. The Treasurer's report, which is delayed for examination, will show gross receipts for the year of $48,781.39, including a balance on hand January 1, 1890, of $10,620.55. The total expenditures have been $33,559.31, leaving a balance of cash on hand December 31, 1890, of $15,222.08. There has been received from Mount Auburn Cemetery $5,360.44, included in the above amount.

Joseph H. Woodford, from the Committee appointed at the last meeting to prepare a memorial of the late Mrs. Francis B. Hayes, reported the following, which was unanimously adopted:

The Committee to prepare resolutions on the death of Mrs. Francis B. Hayes report the following:

It is with feelings of deep sorrow that we record the death of our associate, Mrs. Francis B. Hayes, which sad event occurred on the 20th of November, 1890, after an illness of a few months' duration. Mrs. Hayes was a woman of great activity, very hospitable and social in her domestic life, and remarkably sympathetic and benevolent toward the suffering and needy. She took up the grand work of Horticulture immediately after the death of her good husband, our late President, and continued it with

unabated energy until the day of her death, being all the time a constant and valued contributor to the exhibitions of our Society.

We cannot, therefore, permit the great loss that has befallen us to pass by without recording our appreciation of her many virtues and the great satisfaction she always experienced in contributing so often to the cultivation of the social element in our Society. Therefore:

Resolved, That by the death of Mrs. Hayes our Society has lost one of its most valued members, ever active in promoting the advancement of horticulture by her grand exhibitions at her own beautiful home in Lexington and in our halls, and by the great interest she always manifested in the social enjoyments of our Society.

Resolved, That we will cherish the memory of her noble deeds, her unselfish spirit, and her devotion to the interests of horticulture.

Resolved, That we tender to her afflicted family our sincere sympathy in this time of their great bereavement.

Resolved, That these resolutions be entered on the records of our Society, and that a copy thereof be forwarded to the family by our Secretary.

MRS. E. M. GILL,
MRS. A. D. WOOD,
JOSEPH H. WOODFORD, } *Committee.*

John G. Barker, Chairman of the Committee on Gardens, reported the awards made by that Committee for the year 1890. The report was accepted and referred to the Committee on Publication, and it was voted that further time be granted the Garden Commitee to complete their report.

The President, as Chairman of the Executive Committee, reported a recommendation that the Society make the following appropriations for the year 1891:

For the Committee on Window Gardening, this sum to cover all incidental expenses of the Committee and to be paid through the regular channels, . . .	$250
For the Library Committee, for the purchase of magazines and newspapers, binding of books, and incidental expenses of the Committee, ...	300

For the same Committee, to continue the Card Catalogue of Plates, ...	$100
For the Committee of Arrangements, this sum to cover all extraordinary expenses of said Committee, .	300
For the Committee on Publication and Discussion, including the income of the John Lewis Russell fund, .	300
For the compensation of the Secretary and Librarian,	1,500

These appropriations were unanimously voted.

The appropriation of $6,800, for Prizes and Gratuities for the year 1891, recommended by the Executive Committee at the meeting on the first Saturday in November, came up for final action and was unanimously voted.

The Executive Committee also reported approval of the additional appropriation for the Flower Committee of 1890, voted by the Society at the meeting on the first Saturday in October, with the substitution of $272, in the place of $300, as it appeared from the Report of the Committee that the lesser amount is sufficient. This appropriation also was voted.

The Executive Committee also reported the appointment of Charles E. Richardson as Treasurer and Superintendent of the Building, and Robert Manning as Secretary and Librarian.

The Executive Committee also reported, in regard to the Circulars concerning the Preservation of Beautiful and Historical Places in Massachusetts, referred to that Committee by the Society at its last meeting, a recommendation that the Society pass the following vote:

Voted, That this Society expresses its hearty approval of the movement for the Preservation of Beautiful and Historical Places in Massachusetts, and will coöperate therein, and that a request be made that this Society be named in the act of incorporation to be asked for, for this purpose, and that the Society be represented by the President at such hearings as may be held at the State House on the subject.

This vote was unanimously passed.

Joseph H. Woodford moved that the Chairmen of the Committees on Plants, Flowers, Fruits, and Vegetables be paid $100 each, per annum. This motion was withdrawn by the mover in favor of

a motion by Ex-President Walcott, that a Special Committee be appointed to consider the subject of compensation of committees. The latter motion was carried, and the chair appointed as the Committee, Joseph H. Woodford, Henry P. Walcott, and Charles H. B. Breck.

On motion of E. W. Wood, it was voted to invite the State Board of Agriculture to hold its Annual Meeting, in December next, in the City of Boston; and to offer the free use of the Society's Halls for that purpose, and that the Secretary communicate this invitation to the Board of Agriculture.

On motion of Charles N. Brackett, the Chair appointed Mr. Brackett, Varnum Frost, and Charles F. Curtis a Committee to prepare a memorial of the late Warren Heustis.

On motion of Charles N. Brackett, the Chair appointed Mr. Brackett, Joseph H. Woodford, and E. W. Wood a Committee to nominate a candidate to fill the vacancy in the Committee on Vegetables, caused by the death of Mr. Heustis.

On motion of I. Gilbert Robbins, it was voted that the President appoint a committee of seven members, to revise the Constitution and By-Laws of the Society. The President stated that he would report the Committee at the next meeting of the Society.

O. B. Hadwen, Chairman of the Committee on Publication and Discussion, announced that the Schedule of Prizes and Programme of Meetings for Discussion were ready, and that a copy would be mailed to every member of the Society; also that the first of the Meetings for Discussion would be held on the next Saturday, when H. E. Van Deman, Pomologist to the United States Department of Agriculture, would speak on the work of his Division.

Adjourned to Saturday, January 10.

BUSINESS MEETING.

SATURDAY, January 10, 1891.

An adjourned meeting of the Society was holden at eleven o'clock, the President, WILLIAM H. SPOONER, in the chair.

Charles N. Brackett, Chairman of the Committee appointed at the last meeting to give expression to the feelings of the Society on the death of Warren Heustis, presented the following report, which was unanimously adopted.

The Committee appointed to prepare a memorial of the late Warren Heustis report the following:

The intelligence of the death of Warren Heustis, which occurred on Wednesday, December 17, came to us like one of those unexpected and startling calamities which occasionally arrest our thoughts, and remind us how true it is that "in the midst of life we are in death." Suddenly and without premonition, in the fulness of his strength, he has been called from the scene of his earthly labors which he has so long dignified and adorned.

For thirty years he has been a constant and valued contributor of Fruits, Flowers, and Vegetables at our exhibitions, has been frequently called to serve on important committees, and at the time of his death was a member of the Vegetable Committee, having served in that capacity for eight successive years. He was a very successful cultivator, and was the orginator of the famous Belmont seedling strawberry. Mr. Heustis was also very fond of flowers, particularly the Rose, the love for which amounted, with him, almost to a passion. He was a man widely known from the interest which he took in agriculture and all that pertains to its kindred arts. His circle of friends was large and his loss will be greatly lamented. He was gentle and unassuming in his manners, discriminating and sound in his judgment, and firm in his opinions, though he never pressed them upon his listeners. He always advocated what he believed to be right and just, without fear or favor to any. He was fond of rural life and found his chief enjoyment in the bosom of his family and in the congenial occupations of his farm.

It falls to the lot of few men to enjoy in this life a greater measure of respect and confidence than Mr. Heustis secured from those around him, and now that he has gone he leaves behind the precious memory of an eminently pure, useful, and honored life.

In view of his long and useful services to this Society, his many excellences as a man, and the interest he has always manifested in the welfare of our association, the Massachusetts Horticultural Society desires to place on record its appreciation of his services and its high respect for his character and memory. Therefore,

Resolved, That in the decease of Mr. Heustis there has been removed from our circle an active and devoted friend of Horticulture, whose interest in the work of the Society continued through a long and active life, and ceased only with its close.

Resolved, That these proceedings be entered on the records of the Society, and that a copy thereof be sent to the family of the deceased with the assurance of our warmest sympathy in their great affliction.

C. N. Brackett,
Varnum Frost,
C. F. Curtis,
} *Committee.*

The Chair announced the Committee on the Revision of the Constitution and By-Laws provided for at the last meeting, as follows:

I. Gilbert Robbins,	Leverett M. Chase,
Francis H. Appleton,	John G. Barker,
Henry W. Wilson,	O. B. Hadwen,

Robert Manning.

On motion of Ex-President William C. Strong, it was voted that the President be added to the Committee as Chairman.

On motion of E. H. Hitchings, it was voted that agreeably to the rules of the State Board of Agriculture three prizes of $10, $8, and $6, be given for the best reports of awarding committees, and that the Committee on Publication and Discussion be requested to award these prizes.

The Annual Report of the Treasurer, for the year 1890, approved by the Finance Committee, was read by the Secretary, accepted, and ordered to be placed on file.

Adjourned to Saturday, January 17.

MEETING FOR DISCUSSION.

The Work of the Pomological Division of the United States Department of Agriculture.

By H. E. Van Deman, Pomologist, Washington, D. C.

In accepting the very cordial invitation to address you on this occasion I feel both honored and gratified at being able to meet with one of the oldest and most useful Horticultural Societies in

the country. The subject suggested by your Committee is the work which is placed in my official charge as chief of the Pomological Division of the United States Department of Agriculture, and as I understand it, this is to be suggestive of a discussion of the subject in general at this time. I do so with the more pleasure as I feel sure that ideas will be advanced and criticisms made which will doubtless result in good to the cause of Pomology. It is not necessary that my paper should be long, but rather that I merely touch upon some of the leading thoughts in connection with the work.

It is but little more than four years since the establishment of this Division and the appropriations for its use have thus far been so very small that it has not been possible fully to execute many plans begun, nor prudent to inaugurate others that I have long had in mind. The original purpose of its institution and organization was to do work that cannot in the nature of things be done by the pomological and horticultural societies of the country; and this has been closely followed. It is our constant effort to supplement and assist wherever and whenever possible and thus further the good cause which ennobles manhood, elevates our purposes and makes more delightful the realities of every day life. The good done to the world by Mr. Ephraim W. Bull, of your State, in placing before the public the Concord grape, will never be more than slightly appreciated. It has not only made that variety plentiful and cheap in the markets but it has brought the high-priced and higher flavored Delaware and Catawba within the reach of the humblest daily laborer who toils in the factory or at the forge. If the Pomological Division can be the means of bringing from obscurity some fruit of even less value than the Concord grape it certainly will not have existed in vain.

Among the things that we are trying to do is the *investigation of the wild fruits*. No part of either temperate zone is so richly endowed by nature with wild fruits of such intrinsic value and so susceptible of improvement as the United States, and yet we have only begun their improvement. The cultivation of only four of the twenty-five species of our wild grapes has been attempted and this in a limited degree.

For three years past Professor T. V. Munson, of Denison, Texas, has been working in conjunction with the Division in preparing a monograph which shall cover the entire genus Vitis, as

found growing wild in North America. Already a preliminary report has been issued upon this subject, which I presume has been received by all the members of this Society. The work upon the complete monograph is progressing, but it is necessarily very slow, as the preparation of the illustrations is exceedingly difficult and the field work necessary also requires much time. At the present time we are nearly ready for publication, and the greatest obstacle we meet is in obtaining the necessary appropriations to defray the cost of publication. All the species will be represented of life size and in life colors, including the fruit, wood, leaves, flowers, seeds, etc., so that any person of ordinary intelligence may identify such of the wild grapes as may grow in his vicinity. The text will contain not only accurate scientific descriptions, but cultural notes and suggestions as to the hybridization, etc., for the purpose of enabling those who desire to experiment to proceed more intelligently than without such aid.

The berries have, so far, yielded the most easily to the hand of man, but the tree fruits are also well worthy of more attention than has been bestowed. The whole genus Prunus, as represented in North America has been only recently and but slightly improved, and this merely by the selection of chance wildings. The few native plums thus obtained give promise of much greater things in the future, and to this end it is my purpose to monograph this genus and not only describe and illustrate each native species but try to show what might be done by crossing them with each other and possibly with the common cultivated plum of Europe, *P. domestica*.

When we think of it, it is really surprising how little is known of even our commonest fruits. Who can tell the season of the Baldwin apple in Massachusetts, Ohio, Tennessee, and Texas; or when the Concord grape will ripen in northern Michigan, Kansas, and Florida? If ten of the leading strawberries ripen in Connecticut in a certain order will they do the same in Virginia and California? Why are the same varieties of the orange thicker-skinned and more acid in flavor grown in California than in Florida? These are only specimens of thousands of such questions which are not only of interest to the scientific pomologist but which would be of practical value to the grower if answered from reliable data. A beginning has been made, as no doubt nearly all of you know, by issuing circulars calling for information

which will enable us to prepare special reports upon the apple and the small fruits. Unfortunately the season was unfavorable to the apple last year, over a large part of the country, and it will be necessary to issue another circular this year on the same subject, as it would be unwise to attempt a publication without comprehensive information, and this it has not been possible for our correspondents to give during the past year.

The other fruits are to be treated in a similar way if my purposes are carried into effect. All this requires much thought in preparing the questions and collating the returns and getting them into readable shape. The time and skilled labor necessary in accomplishing this is expensive and could not be borne by any of the state or national societies, and as it is public work it should be paid for out of the public funds. What more legitimate use could be made of the taxes paid by horticulturists? The mere clerical work is a burden that only the general government can and should bear. It has been my invariable rule in selecting clerks, to employ only such as have a natural inclination to pomology combined with a reasonable amount of education acquired both in the class room and in the field of practice, that they may know what they do and also be in love with their work. So far, all the six persons employed in the Pomological Division have been reared in, and taken from the country, and so far as I control the Division there will be none other.

The employment of special agents outside the office has only been possible in a few cases but they have been eminently useful in gathering facts. At present, Mr. John S. Harris, of Minnesota, is investigating the hardy fruits of the Northwest and the Russian apples in particular; also Mr. T. T. Lyon, of Michigan, whom you all know as an able pomologist, is a regular employé of the Division, and at the present is visiting the state horticultural societies of the West, to assist in naming their fruits, participate in their discussions, and endeavor to arrange a system of reciprocity between the national, state, and local societies and the Pomological Division. It is hoped that by this latter means, in due time, much good may be done directly to the fruit growers by collecting and disseminating information through our reports and otherwise. It is especially desired to coöperate with the societies in all possible ways and if anything can be done in this direction with and for your State, I trust it will be brought about.

The proper naming of fruits is a matter which demands our most strenuous and intelligent efforts. Confusion abounds in the field of practical pomology, and if proper skill and authority can be brought to bear in an opposite direction, who will not be glad? Your venerated Wilder, whom we all love to honor, did all he could to simplify names and eliminate synonymes from the nomenclature of fruits. The reform which the American Pomological Society has commenced is an outgrowth of his views, and is well worthy of extensive application. I have delivered before the American Nurserymen's Association a strong appeal to have that body take some action which shall lead nurserymen to adopt in their catalogues the approved names, and thus carry into effect that which the American Pomological Society has so ably begun. In fact, if the nurserymen do not do it no one can. They are the teachers of the public in this regard.

The Nurserymen's Association in their meeting in Chicago, in June, 1889, accepted the truth of the charge that nurserymen often misinform the public as to the true names of fruits (and the same is perhaps true of flowers); but they thought the task of reform too great and no plan was adopted. Of course, whatever is done must be largely or entirely advisory and not dictatorial, and for the purpose of carrying the rules and corrections of the American Pomological Society into practical application I have promised to arrange to have every fruit catalogue corrected in my office, so as to accord with the above idea, and return it to the nurseryman for his approval and final adoption. Thus would progress be made and simplicity and uniformity rule where chaos now is. It would, however, remain to be seen whether the nurserymen would accept the corrections as authoritative. If any one can suggest a better plan I shall most gladly use my best efforts to advance it.

One of the most arduous tasks which I have to perform in the course of my official duties is the naming of varieties which are sent in for identification from all parts of the country. Within the past year more than ten thousand such specimens have been received and passed upon and I am happy to say that in nearly all cases it has been possible to make satisfactory answers. How much of such work has been done by Downing, Warder, and many others at their own cost of time; and often of express bills, small individually, but large in the aggregate, to say nothing of

postage. We have the free use of the mails, and not only letters but packages of specimens go under our frank. I have on hand boxes and franks which will be sent to any person requesting them, thus enabling him to forward any specimens appertaining to to pomology which he may think of interest or may desire to have identified.

One of the first things which I attempted officially was to arrange and have adopted by the state horticultural societies, especially those near each other or having common interests, a system of holding their regular meetings in succession. It is evident that such an arrangement can be only beneficial, as persons wishing to attend the meetings of neighboring States can do so, whereas, if they met at the same time this would not be possible. It also affords opportunity for several societies to engage the services of the same lecturer, whose abilities may be of such a character that his presence is needed in more than one State. I am happy to say that with few exceptions this plan met with approval. In a few cases it was necessary to have the legislatures pass special amendatory acts and in others the constitution of the society had to be changed.

In the course of our official work we obtain information concerning a great many new seedling fruits that have never been heard of except in their native localities. There are many others which might have been found had we been able to make the necessary investigations. To bring these from obscurity and place them where they will be tested is a work that all will agree should be performed. In many cases very little expense would be necessary either in the way of time or money.

I have long endeavored to secure an appropriation that shall enable me not only to collect and distribute these nameless fruits, thus placing them where they may be of some use to the world, but to purchase scions, cuttings, plants, etc., of fruits that are already somewhat known, and distribute them in places where they may be likely to prove valuable. I am sorry to say that so far my efforts have been wholly in vain. The representatives of the people in Congress are their public servants, elected for the especial purpose of serving their constituents, and it certainly would be in no wise improper for the fruit growers of this country to suggest, and perhaps even demand, that something of the kind just mentioned be done.

It is with great pleasure that I can state that within the past few years I have been able to introduce from foreign countries several fruits which have never appeared on this side the great oceans except in their manufactured forms, and which give promise of success in this country. Among these I might name the Citron of commerce, which until within the past year has only been represented by an occasional seedling tree in the southern parts of Florida and California. Not one ounce of American preserved citron is to be found, and yet there is no good reason why all that is needed by our people may not be grown within the United States. Thirteen of the very choicest named varieties were procured from Palermo and Catania, on the Island of Sicily, and from Naples on the mainland of Italy. These were budded from bearing trees at my special order given through the Department of State. Other varieties have been ordered from Bastia, on the Island of Corsica, where, it is said, the very best citrons are grown and shipped to Leghorn, where they are preserved and whence the product is sent to market.

It may not be generally known that in the southern parts of California, Arizona, New Mexico, and Texas there are millions of acres which can be made to produce Dates of as good quality as those grown in Arabia and Persia. Believing this I sent to the date growing regions for rooted suckers from the best named varieties in existence, and within less than one year from the date of this order, which was also given through the Department of State, sixty-three plants were safely landed on our shores, and are now planted in the region before mentioned, without the loss of a single one. In due time it is expected that others will be received. All former efforts to secure rooted suckers of the date have failed, for the simple reason that they were not planted in tubs of earth and well established and then sent in this condition. All the dates growing in the United States, previous to this importation, are seedlings, and, as is the case with other fruits, there is no certainty as to what variety of fruit will be produced in this way; and not only this, but as the date is a diœcious tree there is no certainty as to which sex will be produced. One case, in Florida, has come under my notice, in which five trees were carefully watched until they grew to large size, when all proved to be males. Aside from this, it is certainly advisable, if we begin the culture of the date as an article of commerce, to begin where the Arabs, the

Persians, and the Syrians left off, by procuring the varieties which have come down to them through thousands of years of careful selections.

The Mango is another fruit which has until recently been represented on this continent only by a few seedling trees, but I have procured from India grafted plants of a number of their very choicest varieties. These are now in southern Florida, where they are being propagated on young seedlings, and when ready for distribution they will be placed in the hands of those who are likely to succeed with them.

There is not a pound of Filberts in any of the stores of the United States that has not been imported, and it has occurred to me that our own people might produce what our markets demand, if the original stock were placed in their hands. With this purpose in view I have endeavored to procure from Europe and the British Islands plants and fresh nuts that a thorough test may be made as to their adaptability to this country. The Puget Sound region seems to be a suitable place for this experiment, as the climatic conditions are fully as good as those in Kent, England, where a large part of the filberts found in our markets are produced, and I think the soil is better. There are doubtless other places where they will succeed quite well. These are only a part of the new fruits which I have already been able to procure through our foreign consuls; and it may not be out of place to say in this connection that, although some critical persons may think that our foreign representatives are gentlemen of only political abilities, I have been convinced by numerous practical demonstrations that, as a rule, they are wide awake to the industrial interests of this country. In every case in which I have made application to them through the Secretary of State, I have been able to secure just what was desired or to get information that it was impracticable to do so.

It may seem to some persons that the central part of our country has been overlooked in the procuring of these foreign fruits, but I assure you that this is not the case. Europe is the principal field which can be worked to obtain such fruits as will endure the climate of a large part of our country, and it has been gone over and over for centuries past and very little remains there worthy of introduction. Asia presents a much better opportunity, and if possible we may yet be able to get many valuable things

from there. Allow me to say in this connection that although it may seem a special favor to Florida, California, or Oregon to give them a fruit which they alone can grow, it is, nevertheless, a benefit to the whole country. Does the grower of the Washington Navel orange at Riverside, California, monopolize its good qualities, or does the citizen of Boston share with him? If the Alphonse mango, which is the delight of the resident of India, as he sips its sweet juices on the veranda of his bungalow, can be grown at Lake Worth, Florida, will not the express train land it in New York or Minneapolis in good condition, and thus bring the ends of the earth together? In these days of rapid and safe transit for tender fruits, all sections of the country can be supplied with such things as before were denied to all except those who lived in the favored regions where they grew.

The field opens as the work progresses. The Division of Pomology is now firmly established as a part of the government service and I trust that it may serve the fruit growers of our whole country in a satisfactory manner. Upon them, in part, lies the burden of responsibility as to its conduct, and I frankly invite criticisms and suggestions which shall lead us forward.

Discussion.

O. B. Hadwen was much gratified to hear Mr. Van Deman's statement of the work of the Pomological Division of the United States Department of Agriculture. It is a matter of surprise to many to learn how vast is the amount of fruit, and how almost innumerable are the varieties now grown in our country. It is a leading object of this Society to encourage the production and general introduction of new fruits and vegetables, but perhaps we have been remiss in bringing into notice some excellent new fruits. Fair specimens of new seedlings can be produced in five years, but we cannot depend upon their good qualities being established without several years of trial. He declared his belief in a definite term of life in fruits as in other organic forms, and in this respect some new fruits have too short a term of life to be of much value.

E. W. Wood was interested in the paper just read, but he did not think it affected New England. The work of introducing new fruits here depends largely upon amateurs, as those who grow fruit for market do not find it profitable to go outside of the standard

kinds. The three apples most grown here for sale are natives of Massachusetts. He holds as an axiom that varieties of fruits most profitably grown for market succeed best in the places where they originate. Alluding to the Concord grape, he said he was convinced that this improvement upon the wild grape came from a native. No grape crossed with foreign varieties is desirable for market purposes. The Concord is almost as reliable as any other fruit, except when the season is very backward. The Worden is somewhat earlier and is more popular. There is one advantage in growing new small fruits in that they can be tested sooner.

Professor L. R. Taft, Horticulturist at the Michigan Agricultural College, expressed great pleasure at being present at this meeting. He was very glad to hear from Professor Van Deman how well the work of the Department is being amplified in all directions, and that the Division of Pomology is making such progress, especially in fruits for the different climates of the United States. Through these efforts he hoped some new varieties would be found that would prove valuable for Northern Michigan. His state, he said, is an empire in itself, extending five hundred miles from its southeast extremity to its northwest, and it is a hard matter to find fruits suited to all its phases of soil and climate. While the common standard varieties succeed admirably in the southern half of the state, and in almost any section bordering on the lakes, *ironclad* sorts are needed for the northern peninsula, and for some fifteen counties in the southern.

The Michigan Agricultural College has been testing fruits of various kinds, and has found some Russian apples which are certainly hardy and are said to be productive and to furnish fruit of large size and high quality. These tests were made at various sub-stations in northern Michigan, the principal one being at Grayling, Crawford County, where some fifty varieties of apples, besides pears, plums, and cherries have been planted. At the College they have just planted an experimental orchard of five hundred varieties of apples, pears, plums, cherries, and peaches, and there are very complete collections of the newer varieties of small fruits. In addition to a number of sub-stations in southern Michigan, the station has at South Haven what is known as the Lake Shore sub-station, conducted by T. T. Lyon, President of the Michigan State Horticultural Society, and a special agent of the Division of Pomology.

In Strawberries, a very extended list of varieties has been tested, some of which appeared remarkably successful. The speaker mentioned Bubach's No. 5 (pistillate), as taking a high rank, but requiring rich soil and good culture; Haverland (pistillate), as very prolific; Parker Earle (bisexual), from Texas, as an excellent sort; and Warfield (pistillate), as in the front rank at present.

The work of the Experiment Station in Michigan is in charge of the President and six members of the faculty of the Michigan Agricultural College, each of whom is responsible for the work done in his own department.

As few persons are familiar with the scope of an Agricultural College, he wished to say that in addition to the instruction given by lectures and otherwise, in agriculture, horticulture, veterinary science, etc., the students receive a thorough training in the natural sciences, mathematics, languages, and literature; and even if they do not become farmers it will be of value to them in any calling. For any practical business life, or even for the professional man, a course at some agricultural college, like those of Massachusetts and Michigan, will be more valuable than one at Harvard or Yale.

A unique feature of the Michigan Agricultural College is that every student is required to work two or three hours each day, either on the farm or in the gardens, and thus practically work out the subjects taught in the class room.

William C. Strong said he had enjoyed the paper very much. He was glad to be so fully informed concerning the work and methods of the Pomological Division of the Agricultural Department at Washington, and he thought it would be well for us to consider ways and means by which to forward that work. It interested him to know that there is a central authority looking over the whole field, to gather in and disseminate information in all the divisions of this Department of our government. Such an agency can do very much to improve as well as to increase production, and thereby largely promote the welfare and happiness of the people. As an example, how much more abundant oranges are now than formerly. This is a fruit which can be produced easily,—perhaps more easily in this country than in any other. Through the labors of this Division of Pomology we may expect better knowledge of how to improve the quality and quantity of our present fruits, and also the successful introduction of other

fruits, such as the mango, etc., which are now almost unknown as products of our own country.

Benjamin G. Smith did not agree with Mr. Wood. He differed with him in regard to the Rogers Hybrids for amateurs. He has fifty-five varieties of grapes, including the Wilder, Barry, Salem, etc. He wished to speak a word of encouragement to amateurs as to the treatment of choice varieties of grapes. He always covers his vines in the winter, first pruning severely; but if these vines are neglected they will certainly mildew. He had tested fifty-four varieties of choice grapes, and his final decision is that, all things considered, Moore's Early is the best for general culture.

Samuel Hartwell said that he has perhaps twenty varieties of grapes, but not more than four or five of them are profitable to grow for market. Moore's Early is most profitable, as every grape in a bunch will ripen. The Worden is a very fine grape but it will not ripen so evenly. Purple grapes sell better than white varieties. The Hayes, Esther, and Pocklington are fine sorts; the Niagara is inclined to dry rot, and the Brighton, Amber Queen, and August Giant, are liable to mildew. Some white grapes, the Niagara for instance, come to maturity later and command prices less than half that of Moore's Early. He intends to plant the Worden between these white grapes and as the new plants come on will cut out the old and less desirable white ones. He pronounced the Gravenstein to be the queen of fall apples; every one is perfect and fit for market. He was pleased with the Red Bietigheimer — for cooking only — its size and quality holding it very much in favor. Oldenburg is very productive. The Baldwin originated in this state long ago, and it seems to be deteriorating a little.

William H. Hunt was very much pleased to know what the Agricultural Department is doing. His own experience with grapes had been similar to that of Mr. Hartwell. The statement that fruits succeed better in the neighborhood of the place where they originate is true to a certain extent, although there are many exceptions, of which the Gravenstein apple and Bartlett pear are conspicuous examples.

Mr. Strong asked if we are not liable to carry the question of color a little too far. We should give the black a fair chance, but should it have preference over the white? The reason might be, in some degree, that we do not produce as fine bunches of white

grapes as of black and this may partly account for the preference in the market.

Mr. Wood said he has in his grape house eighteen foreign grape vines, with one Golden Hamburg at the end of the row of seventeen colored. When he sends the crop to market, he finds the one white grape vine has supplied quite as large a proportion of the fruit of that color as is desired.

Mr. Strong said that he formerly grew the Muscat of Alexandria and always got the first prize for it. The Golden Hamburg, however, is not of as high quality as the Muscat of Alexandria.

Mr. Wood considered the Golden Hamburg as good as the Black Hamburg or Wilmot's Hamburg. He had found that white currants do not sell as well as the red varieties.

Mr. Van Deman held that the reason white grapes are less profitable than dark colored fruit, lies in the fact that although white ones do not bruise any more than the others they show their bruises more, and look damaged while the dark ones appear fair. This inference is based upon statements of dealers,— wholesale and retail. In Florida they are planting the Niagara grape by ten acre lots to supply the demand for this fruit. Some are sold to wealthy persons at high prices to make a fine show on their tables, but the general market does not seem to want them in large quantities. As to quality they are quite as good as many dark varieties.

Richard P. Walsh, who had had fifty-five years' experience in gardening, said that while located about twenty miles south of Boston, and ten miles from the sea, he received, with other trees and shrubs from a Rochester, N. Y., nursery, a Purple Hazel, grafted upon a plain hazel stock. The latter was very thrifty and threw out suckers, which were at first cut away, but as the green mingled with the purple foliage was a pleasing combination both were allowed to grow. After two years the purple was choked out, and then the stock produced nuts which proved it to be the true Filbert, *Corylus Avellana*, and a crop of nuts was gathered each succeeding year thereafter. From his observations of both stock and scion, he was convinced that they were both perfectly hardy there. He said they could be grown in hedge-rows, and required but little cultivation, and he was confident that they would succeed in the neighhood of Boston.

Robert Manning said that a few years ago he set out several filbert bushes, one of which produced fruit last year. He showed

some of the nuts at the Annual Exhibition of Fruits last September. The plants seemed perfectly hardy, and the success of the experiment was encouraging, though one of the bushes had been injured by what he thought was probably the same fungus which has done so much damage in England.

Mr. Van Deman's paper was listened to with close attention and a vote of thanks to him for his interesting lecture was unanimously passed.

The Chairman of the Committee on Publication and Discussion announced that on the next Saturday, Ex-President William C. Strong, of Newton Highlands, would present a paper upon "Evergreen Trees."

BUSINESS MEETING.

SATURDAY, January 17, 1891.

An adjourned meeting of the Society was holden at eleven o'clock, the President, WILLIAM H. SPOONER, in the chair.

M. B. Faxon, Secretary of the Committee on Window Gardening, read the financial portion of the report of that Committee, which was accepted and referred to the Committee on Publication.

E. W. Wood, from the Committee of Arrangements, to which was referred a circular from the Michigan Horticultural Society, in regard to the classification of the Horticultural Department of the World's Columbian Fair, reported a recommendation that this Society approve the classification recommended by the Michigan Society. The report was accepted and the recommendation was adopted.

Francis H. Appleton, from the Committee on Publication, to which was referred the subject of the Society's Diploma, reported a recommendation that copies be made by the heliotype process. The report was accepted and the recommendation was adopted.

Adjourned to Saturday, January 24.

MEETING FOR DISCUSSION.

Evergreen Trees.

By William C. Strong, Newton Highlands.

In assigning this subject for discussion, it is presumable that our Committee intended to limit the list to such trees as are hardy and adapted to this latitude. What are commonly called the broad-leaved evergreen trees, such as the American Holly, the *Kalmia latifolia*, and Rhododendrons, would properly come within this list, but the field is too broad to be covered in the time allowed for this session. Therefore, with the single allusion to the bright, fresh, polished green foliage of the Kalmia, which should be more appreciated for its fine winter effect, I propose to confine my remarks to such of the conifers as seem to be of promise for culture in New England. Looking back but a few years, we should find this list quite limited in numbers. But a marked advance has been made within the present generation, including numerous and valuable introductions from the western coast of our own continent, as well as from Japan and other countries, so that we now have a largely increased number, and also very distinct colorings and habits of growth. What an immense gain it is to us that in our cold, desolate winters, we can vary and enliven the evergreen effect by the addition of the glaucous sheen of some of the newer Firs, with the richer green of the Nordmann, the distinct form and color of the Sciadopitys, or the varying grace, in form and color, of the family of Retinosporas! By a judicious use of such material as we now have, a warmth and variety of verdure and a diversity of outline may be given to a landscape, or to a country home, far surpassing the possibilities of a few years ago. In saying this it is not to be inferred that the older kinds are to be displaced, or even reduced to a subordinate rank. They are still the basis of all good work in planting, but they are happily supplemented by recent varieties of differing forms and colors, so that much richer and more pleasing effects can now be produced. Let us briefly mention some of the indispensable older kinds.

Our native White Spruce (*Picea alba*), often called Blue Spruce, is one of the hardiest and most pleasing of conifers. Its conical, thick-set shape, and its light and more or less glaucous foliage render it always a favorite. Though not so long-lived or so valu-

able for timber as the nearly related species, the Black Spruce (*Picea nigra*), it is far more desirable for ornamental purposes and should be in every collection. Individual seedlings can often be found which are quite distinct in form and color, Maxwell's Golden being a good example.

The Norway Spruce (*Picea excelsa*), though a foreigner, has yet become so common and is so perfectly at home with us that we have come to regard it "as to the manor born." However common and perhaps formal and monotonous when repeated in numbers, it is yet so hardy and vigorous in nearly all soils; so fine in single specimens, with graceful, pendulous branches sweeping to the ground; so well adapted for hedge-rows or shelter belts,— in short it has so many good qualities that it is not out-ranked by any other conifer, for landscape work. It varies considerably in habit and we have these sports perpetuated in such distinct forms as *P. inverta* and *P. pendula*, or in grotesque habit like *P. monstrosa*, or as a dwarf like *P. Clanbrasiliana*, *P. Gregoriana*, and *P. pygmæa*.

Our White Pine (*Pinus strobus*) is probably the most profitable of all trees for timber, in our light soils. It does not thrive in a wet soil. But we have thousands of acres of comparatively waste land which should be planted with this species, and it would be a wise economy to give government encouragement to this industry. For decorative purposes the White Pine is also valuable, its soft, silvery green foliage furnishing a pleasing contrast with the more rugged and darker growth of other species.

The Bhotan Pine (*Pinus excelsa*) has longer, more graceful and drooping leaves than the White Pine, but it is liable to blasting of its leader and its branches. In other respects it is vigorous and hardy and its superior beauty entitles it to an attempt to overcome this tendency.

The Austrian, the Scotch, and the Cembran or Swiss Stone Pines are each well-deserving the general use which they receive. They will not vie with the White Pine for timber use, though in conditions where the older growth continues healthy they will have value in this respect.

The Red Pine (*Pinus resinosa*), often, but incorrectly, called Norway Pine, is a very hardy, native tree which flourishes in a dry, sandy soil, from the Middle States into Canada. It abounds in resin, is of value for timber, and deserves a place in a collection, as an ornamental tree.

Our Pitch Pine (*Pinus rigida*), though very hardy and free-growing, is scarcely deserving a place in cultivation, in comparison with better varieties.

Our native Hemlock, *Tsuga* (*Abies*) *Canadensis*, when planted in exposed positions is very apt to suffer from the winter winds. If it were a recently introduced novelty it would be pronounced one of the most graceful and beautiful of conifers, but too tender for ordinary positions. Yet it is in fact one of the commonest timber-trees of New England and Canada. This shows to what a degree hardiness depends upon proper conditions and how careful we should be to make sure that these conditions are complied with, before we pronounce judgment upon the question of hardiness.

Of the Silver Fir tribe, now classed as *Abies*, (*Sapini* of Veitch) the native Balsam Fir is the only variety which may be said to be common in New England. Young specimens are very beautiful, especially in the northern sections of its growth. But it is subject to diseases in this vicinity, is short-lived, and must give place to much more desirable varieties of this class of Silver Firs, of recent introduction. A dwarf Balsam Fir, named *Hudsonica* by Dr. Engelmann, is found in the White Mountain region and in Maine, which is quite prostrate in growth, and roots from its branches like the prostrate Juniper.

The various forms of the Arbor Vitæ (*Thuja occidentalis*) are in frequent use and are essential in all collections. The so-called Siberian variety is given by Veitch as *Thuja plicata*, coming from the neighborhood of Nootka Sound and Siberia. Hoopes, however, quoting from "Gordon's Pinetum" considers it as having originated at Ware's Coventry nursery and therefore to be called *T. Wareana*. In the latter case it is to be regarded as but a fixed variation from *T. occidentalis*, differing mainly in hardiness and compactness of growth, qualities which make it very desirable for many purposes.

The Savin (*Juniperus Virginiana*), varying much in form, color, and habit of growth in different seedlings and often very attractive, will complete the list of conifers in common use up to a comparatively recent date.

I will now mention some of the more desirable additions which have been made within the past few years, without any attempt at a complete list, and will then pass to consider a few points in culture, which I deem to be important.

The Silver Firs will rank as among the most desirable ornamental trees. The European Silver Fir (*Abies pectinata*) is scarcely hardy with us, except in protected places, but the closely allied *Nordmanniana* is quite hardy and thrives well, with the single fault of liability to lose its leader. Its stately habit and dark, rich, glossy green foliage render it one of the handsomest of conifers.

Abies concolor is a more recently introduced fir from Colorado, its type in the Sierras of California being known under the names of *lasiocarpa* and *Lowiana*. Its name *concolor* implies the like silvery color on the upper and under sides of the leaf. It is one of the stateliest trees of the Rocky Mountains, and retains its beautiful color in old age. As the type from Colorado seems to be quite hardy and to be suited to our climate, it bids fair to become one of the most useful and desirable of the recent introductions. A magnificent specimen may be seen at Wellesley in the collection of Mr. Hunnewell.

In the same collection is a fine specimen of the Japan Silver Fir (*Abies brachyphylla*). It proves to be one of the hardiest and handsomest of Firs, its two under silver lines being quite conspicuous.

Abies Cilicica is reported as not accommodating itself to the climate of England. It has done well in this country, however, a good example of it being also in Mr. Hunnewell's collection. This is proof that some varieties may be better suited to our climate and therefore more hardy than even in England. It is only by trial under various conditions that we can determine hardiness. This rule will apply to the three following firs of our northwest coast.

The great Silver Fir (*A. grandis*) attains to the height of two hundred feet and upwards, along the Fraser River and Vancouver's Island, and at altitudes of four thousand feet. Its branches are slender and less thickly set than in most, and hence it has a light, graceful, and airy appearance which is very desirable.

Abies amabilis is reported by Professor Sargent as growing freely on the Cascade Mountains and as far north as the Fraser River in British Columbia, and as the most beautiful of the genus with which he is acquainted. As it grows at altitudes of four thousand to five thousand feet in this northern latitude we are not without hope that it may be domesticated with us.

Abies nobilis has a more southern range, growing in Oregon and California to the same immense height, and being very conspicuous for its deep, glaucous-green, thick-set, crowded foliage.

These three magnificent firs have a mountain habitat and it is too early to speak decisively of their fitness for our climate, but they are eminently worthy of careful trial.

The Douglas Fir (*Pseudotsuga Douglasii*) or false Hemlock is another giant of the northwest, being a principal tree of the vast forests of British Columbia, and attaining a height of two hundred and even three hundred feet. It has had extended trial and may be pronounced hardy and decidedly ornamental, when planted in a moderately dry soil. The type from Colorado has never suffered from the winter with me.

I am not aware what trial has been made with *Tsuga Albertiana*, the Hemlock of British Columbia. The type is distinguished from our common Hemlock only by its more robust and rapid growth and spreading branches. It succeeds well in England, and coming from such northern limits it is reasonable to hope it will prove more hardy and desirable than *T. Canadensis*.

Of the family known as Spruces, now classed as Piceas, decidedly the most promising recent introduction is *Picea pungens*. It has also been known as *P. Engelmanni* and *P. Parryana*. It has a wide habitat, extending from New Mexico to the head waters of the Columbia River, its Colorado type being found to be perfectly hardy and suited to our climate. Its growth is stiff, very thickly covered with rigid, very sharp pointed leaves, from which it derives its name. It varies considerably in color from deep green to steel blue, or lightest silver. Its remarkable color and regular outline render it one of the best of conifers for the lawn. Fine specimens of this tree may be seen at the Arnold Arboretum, and also on the estates of Professor Sargent and Mr. Hunnewell.

Menzies's Spruce (*Picea Menziesii*) is a tree somewhat similar to the last, though less in degree of characteristics. It deserves a place in a collection.

The Oriental Spruce (*Picea orientalis*) of the Caucasian region is quite hardy with us, its foliage being of a bright, glossy green and its slender branchlets giving it a distinct pointed outline.

Of the Pine family I will mention only the Corean pine (*Pinus Koraiensis*) as being specially useful for decoration. It has long, glossy green foliage, silvery within; its habit is compact, dividing into numerous branches when about twelve or fifteen feet high, rendering it most suitable for positions where taller varieties would be undesirable.

The Umbrella Pine of Japan, as it is commonly called (*Sciadopitys verticillata*), is the most distinct of all the additions to our list of hardy conifers. It is remarkable not less for its form and habit than for the length and color of its leaves, which spread out like the ribs of a parasol. It has gained in reputation for hardiness, especially if somewhat sheltered, and since its effect is so distinct and excellent it will doubtless become very popular. Its habitat is limited to a mountain in the Island of Nippon, but it is being cultivated and distributed by the Japanese, as also in Europe and in this country.

To the Japanese we are also indebted for the introduction of the family of Retinosporas. This has now come to be a numerous and important class, owing to the many garden sports from the two original Japanese forms, *obtusa* and *pisifera*. Most of these are quite hardy in a moist and not too exposed situation. They are of moderate size, or low growing, with the exception of *obtusa* and *pisifera*, and since they give great variety in color and form they are much in use for garden work. We have the graceful, pendulous growth of *filifera;* the soft, silvery dew of *squarrosa;* the rich green of *plumosa;* and the bright, golden colors of *obtusa aurea* and *pisifera aurea*. For decorative purposes they are important acquisitions.

From the same prolific source, the Islands of Japan, we have received the *Thujopsis dolabrata*, a beautiful tree, resembling the Thujas, as its name implies, with short, thick, imbricated leaves, dark green above and glaucous beneath. It forms a conical tree from forty to fifty feet high, with extending pendulous branches sweeping to the ground. Though not generally distributed, it has proved hardy in several exposures and it well deserves extended trial.

Of the Junipers we may mention *Cracovia* as a desirable, hardy, erect, robust variety of *Juniperus communis*, and also *J. Virginiana glauca* as specially fine in color and form.

Without dwelling longer upon the list of varieties let us pass to consider some points in culture. First of all I wish to speak of the

Time for Planting.—The impression prevails that there is more risk of loss in transplanting evergreen trees than deciduous trees. This is undoubtedly true when trees of considerable size are taken. The very name indicates that these trees are always in full leaf.

Consequently there is an immediate draft upon the resources of the tree, after planting. It is essential, therefore, that there should be immediate root action, to supply this demand. It is then self-evident that the fall is not a favorable time for this work. Undoubtedly there are many instances where trees, with more or less earth, have been removed late in the fall, and have lived. But in our cold climate there is little or no root action from November until May, and hence the tax upon the tree late planted and exposed to the drying winds of winter and early spring is very great, and frequently fatal. There is a very general agreement among planters that early spring is also an objectionable time. The ground in March and April is usually wet and cold and the root action must necessarily be very sluggish and insufficient to supply the increasing demand from evaporation.

But in the month of May the ground has become warmer and all the organs of the tree are excited into activity. It has been found by uniform experience that a most suitable time for removal is just as the buds begin to swell and indications of returning life appear. There is sap enough stored in the tree to sustain it until the speedy action of the roots will continue the supply. Consequently the great bulk of this work is confined in our latitude to the month of May. It is unfortunate that this large work is confined within the narrow limit of this busy month. There is also a more serious objection that the inevitable check consequent upon removal occurs just at the time when the tree is coming into its active growth. It is, therefore, to be expected that this growth will be enfeebled and the appearance of the tree affected, for the first year. If a hot, dry spell occurs in June, the evaporation from the young growth is excessive and losses frequently occur. Still we must repeat that May is the month for removals. Is it the only month? For many years past I have advocated the month of August as a most suitable time. As an extensive experience has confirmed this opinion and as considerable adverse criticism has been advanced, I desire to state the case with some fulness, in the hope that, so far from misleading the public, I may help, by extending the time for doing this useful work, to contribute a real advantage in the adornment of our homes and of the landscape.

In the year 1871, I owned a nursery plantation of about forty thousand Spruces, Arbor Vitæs, Pines, and Hemlocks, of varying

sizes, from two to six feet in height. As I desired to convert the land on which they stood into an ice pond, I decided to remove the trees during the month of August, to a lot about half a mile distant. It was a large experiment, but I reasoned that the conifers make their growth by the first of July, and the rest of the season is spent in maturing the wood, so far as the tops are concerned. But the roots on the contrary are in a condition for active growth throughout the season, and especially so if placed in a new and mellow soil. The ground is warm in August, and when newly stirred is friable and in excellent condition to encourage quick root action. As the year's growth of wood is fairly well matured by the tenth of the month, the tax from evaporation is only moderate and this is met by the night dews and the moisture which usually occurs with the dog-days. Upon theory then the trees should easily sustain the shock of transplanting and speedily commence the formation of roots, which should have a firm hold in the soil before the ground freezes. The August and subsequent fall of my experiment proved to be exceptionally hot and dry; indeed so severe was the heat and drought that our late President, Joseph Breck, predicted a total failure. I hesitate to mention the facts as a precedent, yet it is true that in the face of a broiling August and early September sun, for week after week the trees were transferred, without the aid of any water or mulch to assist them. In November following, I had the pleasure of taking up several of the trees and showing to Mr. Breck the very abundant formation of new roots. The warm, floury condition of the soil was conducive to this growth. A wet fall would not have been as favorable. But the new lot was on a northern, exposed slope and the prophecy was that the winds of the following winter would ruin the trees. Any one who had seen the new roots would know that there was little danger of this result. The following summer showed as fine a field of newly planted trees as I have ever seen, with less than five per cent of loss, as I now recollect. The success was so complete, on so large a scale, and under what would be considered adverse circumstances, that I have ever since considered the question as settled. It has been my custom in subsequent years both to transplant myself, in August, and also to sell trees, as ordered, and the results so far as I know have been uniformly satisfactory. Indeed, I have removed at this season trees of larger size than I should care to take in May. And these

were trees which had stood so long without previous removal that a large percentage of loss should have been expected, yet it has been an agreeable surprise to me to find much less loss than I have ever had with such trees in May. Nor is this all. The growth of the following summer has uniformly been better than with trees planted in May. Pines, spruces, and other varieties stretch away as if they had not been stirred. In August, 1889, I planted a hundred Norway Spruces, which were about eight feet high, in a hedge-row and not one of them failed. At the same time I removed over three hundred *Picea pungens* and *Pseudotsuga* which were from two to four feet high and lost only one, and this one was evidently in feeble health when taken. Last August I transplanted about fifteen hundred *Picea pungens* and other kinds and they were as usual, without a single exception, so fresh looking in November, that I invited our Garden Committee to inspect them, with the purpose of showing the new roots, but the early freeze prevented the visit. I am confident that next summer's growth will show much more vigor than could possibly be expected if the trees had been planted in May. And I will allow any failures to stand in the lot until the first of August next, so that any one who desires can see what liability to winter-killing there may be. I do not anticipate any. Let it be distinctly understood that this is August and not fall planting — not later than September 15 — which I recommend.

But I hear it said that all this applies to removals for short distances and with special care and favorable weather. As to weather I have tried all sorts, from excessive wet to excessive dry, with uniform success, though a medium is of course the best. As to special care, this should always be given,— no more in August than in May. And in regard to distance, it is to be said that it is difficult to send large sizes long distances, at any season. They are liable to heat when packed in boxes and also to become exhausted by evaporation during the time required for transit and before the roots can become re-established. Hence it is always best to procure conifers of local growth, where this can be done, especially if they are to be of some size. Undoubtedly early spring is the best time for importing this stock from Europe, the liability of heating being less at this season. Care should be taken, however, not to plant until the ground becomes warm. But I have sent sizeable trees as far as Mount Desert, and various

other distances, in August, with excellent results. In the early part of September, 1889, I received a lot of wild seedlings picked up in the latter part of the previous August, from the high altitudes of the Rocky Mountains. From such wild stock, with growth more or less stunted, we expect, as a matter of course, that there will be much greater loss than from nursery-grown trees. Last August I inspected this stock, after it had been planted a year, and the following results were shown:

Out of 2,800 *Picea pungens* received, 2,330 were alive.

Out of 3,220 *Picea concolor* received, 2,389 were alive.

Out of 500 *Pseudotsuga Douglasii* received, 355 were alive.

I must also in candor mention another lot of 1,000 *P. pungens* of larger size, averaging about a foot and a half, received from another collector, and a good deal stunted, of which there has been a loss of a little over one-half. I do not, however, consider this last lot a fair example. It appears then that the loss on the first lot of *P. pungens* was about sixteen per cent and on the *concolor* and Douglas Fir, about twenty-five per cent. It has been my experience that these last mentioned two firs do not transplant as surely as the Spruce. It is my opinion that *Picea alba* taken from the pastures of Maine in May would not give better results than were shown by *P. pungens* which travelled twenty-five hundred miles in August.

An extensive experience covering a period of over twenty years leads me then to this general opinion that in cases where conifers can have quick transit it is safer to remove in August than in May. Especially is this true with large sized trees, like Spruces from eight to ten feet high, where distance does not forbid taking them in wagons. In all cases the growth of the first season after transplanting will show a marked contrast in favor of the August planted tree. If this opinion is sustained by the experience of others it will prove to be a most important advantage in extending the time of planting to more than double its usual narrow limits, and to a season when there is more leisure than in the hurry of spring time. This subject appears to me to be of such importance that I am willing to bear the brunt of sharp adverse criticism until the truth can be demonstrated.

Culture.— I will close with a few brief suggestions in reference to culture. It is wise to consider the habitat of each specimen and endeavor to supply similar conditions of soil and exposure, so

far as is in our power. Because a tree succumbs in a given case, it will not do to pronounce its variety unsuited to our climate. Forests of timber trees of the Hemlock flourish far to the north of us and yet the Hemlock is undoubtedly too tender for exposed positions in this vicinity. We should provide sheltering windbreaks for plants of doubtful hardiness. On the other hand we would not naturally select a too warm and sunny position for such dubious Firs of the Rocky Mountains as *amabilis*, *nobilis*, and *grandis*. We should infer that they would receive too much winter excitement and that a protected, but cooler and perhaps northern slope would secure more nearly favoring conditions. It is obvious that the Pines will take the lighter soils; the Spruces, Firs, and Junipers choosing the intermediate, while the Retinosporas and Thujas will thrive in even a wet soil, though by no means preferring this condition. Though there are increasing evidences of the hardiness of the Sciadopitys, yet I have observed that in full exposure to the winter sun its foliage is liable to lose its fresh, green color and to become brown. Specimens looking north and shaded from the sun do not have this appearance. There can be no question that the rich and varied colors of some of the newer varieties depend in a considerable degree upon the nourishment received from the soil. You have observed the deep, luxuriant color of the Purple Beech under high culture, in contrast with the dull brown of the same tree in a poor soil. Similar results may be expected with conifers. It is an exploded idea that they will not endure enrichment. Fresh horse manure is undoubtedly too hot for the surface roots, if applied in quantity, but cooler composts will heighten colors to a surprising degree. Youthful vigor may also be thus restored to older trees. I have found that the silvery sheen of the *Picea pungens* may be greatly increased if removed from a heavy soil to a floury, well-enriched loam.

We are but beginning to appreciate how well-deserving of the highest cultivation are these enduring products of Nature. They are not limited to a brief glory of inflorescence; they are not confined even to an entire season. They are ever-verdant, furnishing a cool and varying shade in the heat of summer, and a sheltering warmth and cheerfulness, which can brighten and glorify even a winter landscape.

What a curious, strange, wise device, that these trees should have been so constructed that their leaves can endure the freezing

of generally two and in one case, at least, the *Pinus aristata*, of sixteen winters, without losing their vitality! And the form of the leaves is such as to offer as little resistance as is possible to the winds and the snows. Surely the wisdom and the goodness of the Creator are seen in this as in all His works. Conifers were created — not evolved.

Discussion.

Charles S. Harrison, of Franklin, Nebraska, said that in the west great interest is being awakened in conifers. There their cultivation is beset with serious difficulties. The air of the western plains registers only about 50° of moisture against 90° in the Atlantic States. For this reason many eastern evergreens fail entirely. There is no use in planting the White, Black, or Norway Spruce near the 100th meridian. He had spent hundreds of dollars in finding out what he could not do.

The *Pinus ponderosa* is a graceful, hardy, heroic tree. It does well anywhere west of the Missouri River. In form it resembles the Austrian Pine, but is of a deeper green and finer form. It has long glossy needles, and when in a thrifty condition is crowned with massive plumes, which render it very attractive. On his grounds, though the mercury averaged 100° in the shade for over two months and the American siroccos blew like a blast of death, and though the rainfall for the year was only seven inches, making it impossible for any water to reach the roots,— in spite of all this, these trees made a growth of a foot and more. They thrive in the foothills of the Rockies, where their roots may not be wet for years. If pressed too hard by the drought, they will drop two-thirds of their needles, and by thus taking in sail will live on. These trees which have been tested in the east have been from the dry, hot foothills. He thought that if brought from an altitude of nine thousand feet, where they lie much of the time under the snow, they could be made to succeed. The Douglas Spruce, he thought would be the most thrifty of all the evergreens. It is so in the eastern nurseries and on his own grounds. He saw it in the yard of D. Hill, of Dundee, where the ground was unfavorable, and it was by far the thriftiest tree on the place. B. E. Fernow, our Chief of the Forestry Division of the United States Department of Agriculture, says he saw on the western slope the greatest burden of timber on earth, of this tree. In the higher altitudes it often

puts on a silver type, and in the distance looks like *Picea pungens*. It has a wide diversity of form and foliage; some trees have short needles like the hemlock; others have needles of great length; some trees have a graceful, pendulous habit; others are more rigid. The deeper colors with silver tints will be very attractive. But from long observation Mr. Harrison believes that the *Abies concolor* will be the tree of the future. Henry Ross, Superintendent of Newton Cemetery, and Mr. Hunnewell have some fine specimens growing, but even from these one can hardly conceive of the beauty and attractiveness they present in their mountain home. While in old age both the *pungens* and the *Engelmanni* revert to the green and lose the silver, the *concolor* retains its unique beauty down to its death.

Mr. Harrison said he had seen massive trees half dead, with limbs yet alive, robed in all the beauty of youth. You can pick out a grove of these trees miles away, from their rich contrast with the neighboring green. He would like to show the meeting a grove in the fruiting season. Here is one tree of richest sheen — silver and sapphire — the new growth being soft green. On the under side of the limbs are deep purple blossoms. The cones are purple also and are massed in large numbers on the top of the tree. The next tree of the same rich color, strange to say, has cones and blossoms of light green. He had seen two bunches from the same stump, with this diversity of color. To add to the effect a gum exudes from the cone, clear as crystal, which sparkles in the sunlight. Now stand back and let the breeze and the light play upon the branches, and mingle all the rich colors, and you have a scene worth crossing a continent to behold. These trees are somewhat hard to transplant, though T. C. Thurlow and W. C. Strong have made about seventy-five per cent of trees direct from the mountains live.

Mr. Harrison spoke of the adaptability of the soil and climate of Massachusetts to the conifers. He wondered that there is so little attention paid to beautifying the home and the farm when such facilities were offered. It is a shame so many old farms are deserted, and a further shame that many now worked are almost as bleak and dreary as a western prairie, when a little effort would make them charming elysiums. In the west one has great difficulty in starting the evergreens, but where once established they are doing well. Last spring the speaker planted over fifty pounds

of Rocky Mountain seeds, and thought that if Job, out on the borders of the Arabian desert, had attempted to raise conifers from seed and succeeded, he would have added to his reputation for patience. In planting seeds of conifers in the west one must observe the conditions of nature. First, have a screen to shut out over half the light, and cover the seeds with fine sand; but that is not enough. Heat and damp both attack the crown of the delicate plants and therefore they must be defended as in the forests by moss or coarse leaf mould. The plants, growing up through this, are protected so that some beds are defended even against a raging sirocco of 110° in the shade.

Mr. Harrison thought that the best way to secure the finest colored trees would be to select them where they grow by thousands in the mountains. For instance, in raising *Picea pungens* from the seed, away from its native habitat, it does not average as well for color as those mountain grown. He spoke of the difficulty of having these trees, when shipped from the mountains, retain their color. This will sweat out in transit and the planter will often think he has been defrauded when the very choicest specimens have been sent. Rich ground and good cultivation will, however, in a year or so restore the color to more than its original beauty. He said also that there is otherwise a marked change for the better under cultivation,— the needles become much longer and the color much brighter. Of course the sheen is dimmed by winter weather, but is restored to its marvellous beauty in the growing season.

Regarding autumn planting,— if he lived east he would practice it, but not in the dry air of the west. He read Mr. Strong's article in "Garden and Forest" while in Nebraska, and dropping the paper went out and planted three hundred trees, most of which died. But he concluded to charge it to the climate rather than to Mr. Strong, for that gentleman certainly had had wonderful success, and his advice in the matter had been largely followed by nurserymen east, and as far west as the Missouri River. He said that the planting of evergreens is now receiving much attention on the plains and that the west would vie with the east in making our whole country beautiful in forest, lawn, and landscape.

Jackson Dawson held that evergreens could be transplanted at any time in the year if proper care is given to the trees. Twelve years ago Mr. Paul, of London, had an order to furnish several car-

loads of evergreens, and plant them in fair-grounds forty to fifty miles away. A car-load was dug up, packed, transported to the fair-grounds, and replanted. By such instalments the order was filled in May. Before the end of June all these trees had to be cleared from the fair-grounds; therefore the same process was repeated and the trees were replaced in Mr. Paul's nursery grounds, without the loss of a single one; indeed they made a fair growth that season. Mr. Dawson thought well of home-planting of evergreens in August, but he did not think it probable that a case of evergreens could be transported fifty to one hundred miles at that season and come out well. If they did not suffer from drying of the roots while out of the ground, a fungus would probably be developed which would destroy them. He believed the best time to plant them was when the buds are swelling, or after they have completed their term of growth. There are two sets of roots formed in each year; the first just after starting to grow in the spring; the other in the summer, after the short season of rest. If a seedling or small plant is potted in July it will throw out new roots in two weeks, which illustrates this law of the whole family. Mr. Dawson's first work, after his return from the war in 1864, was the removal of one thousand Arbor Vitæ trees, from six to twelve feet high, which had to be done between the second of June and the second or third of July. They are all healthy plants today. In 1885, three hundred and fifty white-pine trees were procured in November in order to have them ready for use in the following spring. They were heeled in and covered with leaves, which kept them moist, and prevented heaving by frost. They were all planted out in the spring without loss. Not only conifers but all other evergreens are really easier to transplant because the roots are always in action, and loss from transplanting arises chiefly from the careless, hap-hazard manner in which the work is generally performed. *Pinus ponderosa* is a good tree in parts of the west, but it does not appear to succeed here. He started to grow pine and spruce seeds from western localities with good success. He planted out twelve or fourteen hundred seedlings of *P. ponderosa* from the collection, but they have gradually died out; a fungus attacked the bark, and eventually destroyed them. There is a tree in the Botanic Garden at Cambridge, grown from native Colorado seed, which is a good plant. *Pseudotsuga taxifolia* has sometimes been called *Pseudotsuga Douglasii*, and *Abies Douglasii*; when

brought from Colorado, it is hardy, but if seed is brought from California the plants prove too tender for this region. There is a very beautiful false hemlock — a new form of *Pseudotsuga taxifolia*, introduced by Robert Douglas, of Waukegan, Ill., which is a perfect weeping tree, and seems to be a most desirable acquisition. *Abies sub-alpina*, a species brought from Mount Shasta, is perfectly hardy, but is not a strong growing tree in Massachusetts. *Abies Engelmanni* is a promising but rather slow growing tree. It is more compact and more conical than *A. alba*, and a specimen in the Arnold Arboretum, now seventeen or more years old, has never shown sunburn or scald. *A. concolor* from Colorado and Utah stands our climate well and is one of our best evergreens — very beautiful and valuable. Mr. Dawson fears that *Picea pungens* will not realize all that was hoped for it, as a fungus has attacked the leaves of several trees; but they were growing upon rather poor soil, and the fungus may not become general under more favorable conditions.

Jacob W. Manning said that in 1872 ten Rocky Mountain evergreen conifers were added to his collection, including *Pinus flexilis*, *P. ponderosa*, *P. contorta*, *P. Murrayana*, *Abies Douglasii*, *A. pungens*, *Picea concolor*, and some others. J. T. Allan, of Omaha, then Secretary of the State Horticultural Society of Nebraska, collected in that season about 50,000 of these trees, in the Colorado spurs of the Rocky Mountains; and exhibited ten of them, in tubs, in Boston, in September of 1873, at one of the most successful meetings ever held by the American Pomological Society. These trees were presented to Mr. Manning by the owner at that time, and they were planted in the Reading nurseries. *Abies pungens*, *A. Douglasii*, and *Picea concolor* were successful, and were subsequently sent out to some customer who could not be identified afterwards. The speaker has ever since regretted their sale, as they were about the first trees of the kinds that were planted in New England. Mr. Manning next became interested in sixty-two *Abies pungens* which were growing in the Botanic Garden at Cambridge. It was in the year Professor Charles S. Sargent became Director there. The gardener in charge notified Mr. Manning, that autumn, that it was proposed to sell those trees, and he then thought one hundred dollars a fair valuation for the lot. At that time they had no reputation here for excellence in

any respect; therefore there was no demand for Rocky Mountain trees, but Professor Sargent said that if they were in England they would command a guinea apiece. Later on they were distributed to various points around Boston, some being sent to Forest Hills Cemetery and the Bussey Institution, and some planted in private grounds. They have served as object lessons in beauty of form, color, and character, and have created a desire and demand for specimen plants of those having the silvery green foliage. After it was well known that the beautiful evergreen trees of California would not succeed in New England, full twenty years elapsed before it was learned that the same species taken from their native forests in Colorado, or grown from seed brought from that region, were hardy in the East. While either trees, or seeds from trees, of the same varieties grown upon the Pacific coast ranges in California, uniformly failed here, both trees and seeds which were carried from California to England were grown successfully there, but if brought from thence to New England they just as uniformly failed. But those sixty-two trees before mentioned as doing well in the Botanic Garden in Cambridge, were raised in England, from seed grown in *Colorado*, and were imported into this country when quite small. This discovery, if not new, was an important factor in leading to the present demand for Rocky Mountain trees. Their number now in sight here can be counted by hundreds of thousands, in seed-bed stock and larger growth. Thus the Douglas Spruce, *concolor*, *pungens*, and *Engelmanni*, are becoming more and more common in nurseries, and desirable in collections of trees, and their names are found easier to speak.

F. L. Temple said that the most valuable sorts of new evergreen trees in this latitude, are those we get from the region of which Mr. Harrison had so eloquently spoken to us. Most of the conifers of Europe and Asia are already well known to us, and we know pretty well what can be expected of them here. We cannot expect much more of special value, from those sources, unless, it may be, in the way of new varieties of the species which we already have. He had cherished very great hopes of the future usefulness of the *Picea pungens* in this latitude, and had been enthusiastic in its propagation, but, while the blue form in the young trees is wonderfully beautiful, it appears to be a fact that none of the full grown trees, even in its native habitat, hold the full blue color so attractive in the younger trees. The plain,

green form of it is one of the least beautiful of all our conifers, and he had seen it used by the thousand in an English nursery, in trees from two to four feet high, to fill in roadways, as the green trees could not be sold there at any price.

He thought *Picea pungens*, in its blue forms, would always be used largely for ornamental planting, but it is well to know the truth, which seems to be that its duration, as a blue tree, is only for a period of, say thirty to forty years. He is more and more convinced, however, that we have, in *Abies concolor*, a tree of the very first rank as to permanent color and beauty, and which is destined to come into popular favor and be very largely planted to give a rich touch of unusual color to our masses of evergreen trees in ornamental plantations. Its great scarcity and high price are the only obstacles to its immediate use in large quantities, and a supply will soon be grown to meet the demand. The curious fact of this tree having the upper side of its foliage of the same beautiful, silvery blue as the under side, makes this superb silver fir the most strikingly effective tree, even to casual observers, of any species whatever now known to our gardens.

On the question of transplanting evergreens, Mr. Temple agreed pretty closely with Mr. Strong, although he believed that the larger portion of losses sustained in this work are due more to careless digging and packing, and lack of attention afterward, than to the supposed difficulties from planting at a wrong time of the year. Another serious fault in such changes is the inattention to proper selection of ground. Many trees set in moist ground live and thrive, which if on a high and dry place would surely die. In Mr. Temple's own grounds he has thousands of Balsam Fir and White Spruce trees, put in between September 20 and the middle of October, which with few exceptions rooted well.

Mr. Dawson did not fully agree with Mr. Temple in regard to evergreens from the old world. He considered *Abies Veitchii* as the very best we have so far as he had seen them. *A. Sachaliensis*, *A. brachyphylla*, *A. Cilicica*, *A. Mariesii*, and *A. Cephalonica*, he esteemed highly desirable. Of the pines he named *Pinus Koraiensis*, *P. monticola*, and *P. Peuce*, and of the firs, *Picea omorika*, *P. Ajanensis*, and *P. polita*, — all of a promising character. Evergreens may attain a good growth in a sand-bank, in from one hundred to two hundred years, but when we plant them for ornament the ground must be in the best condition in order to have them make their growth in our own day and generation.

Benjamin G. Smith asked what fertilizers are best to use for evergreens.

Mr. Dawson replied that any good manure can be used. Cow manure is preferable on high, dry land, — in fact anywhere except on low, wet places.

Edmund Hersey regarded the Hemlock as the most hardy and reliable, as well as the most beautiful evergreen tree we have. On his land he has no other tree of this family that will endure the extremes of our climate so well. He has them in positions exposed to the ocean blasts and the north and northwest winds, and they have sustained no injury during the last thirty years, while some of his Red Cedars, with the same exposure, and even in more sheltered places, have been winter-killed. The hemlock makes one of the most beautiful hedges, and it can be trimmed in a manner to make a thick, close hedge to the ground, leaving no open space even after a period of thirty years.

Mr. Dawson said there are no other evergreens in Massachusetts — perhaps in the world — so fine as the Hemlock and White Pine. The hemlock loves moisture, as from a brook at its foot, but not to stand in decidedly wet land. It will thrive if it has an eastern, northeastern, or even north or northwestern exposure, better than with a south or southwestern aspect. He considered both as among our most noble and valuable trees.

Mr. Manning agreed with Mr. Dawson and Mr. Hersey as to the hardiness of the hemlock. He referred to a certain slope or steep hillside, in the Arnold Arboretum, at West Roxbury, which is well covered with a grove of fine specimens; also to the shore of Lake Kenoza, upon the grounds of the late Dr. James R. Nichols, at Haverhill, and the east shore of Spot Pond in Medford and Stoneham. One of the noblest specimens of this tree known to him, is still growing in the west part of Wilmington; it is five feet in diameter, eighty feet high, and spreads its branches over a diameter of sixty feet. The hemlock prefers a cool, damp soil, but grows well on any deep soil in his own grounds, even where the winds have ample sweep. In transplanting the hemlock or any other species of conifer, drying between the digging up and replanting should not be allowed. According to his knowledge and experience the best thirty days in the whole year for moving any conifers, in this latitude, are from April 20 to May 20. He has long been known as an "evergreen" man, and has practised close pruning of hedges and single specimens, but he is convinced

that a better hedge and a far more lasting one can be secured by a general shortening-in of the shoots, from the top to the bottom of the hedge, than by close shaving to a line, and the same principle will apply to belts specimen trees. Contracting the growth of these hemlocks may be very well where room is lacking to allow of more natural growth and expansion of the trees, but otherwise their health and beauty are promoted by more liberal treatment.

E. H. Hitchings spoke of riding from Dedham to Boston, over the Dedham Branch Railroad some fifty years ago, when he heard a fellow passenger call attention to a group of evergreens, saying that they always gave him pain, for they reminded him of the Stoics, as they appeared so utterly indifferent to storms and all other surrounding circumstances. Mr. Hitchings, on the contrary, appreciated their many excellent qualities and enjoyed them exceedingly. He mentioned a fine, double stemmed hemlock standing in West Dedham, which, for its beauty and noble appearance, was worth a walk out there to see.

Mr. Dawson alluded to Mr. Manning's remarks on Hemlocks for hedges, and asked his views concerning the Arbor Vitæ and other evergreens for that purpose, and their treatment.

Mr. Manning said that among all our trees there is no other so well adapted to use for a common hedge plant as the American Arbor Vitæ. It is one of our hardiest plants if well grown in soil suitable for cultivation; it can be dug up, and transplanted with great ease, and will endure more hardship than almost any other coniferous tree. If breaks occur in a hedge of it, even if twelve feet high, the places can be filled in with trees of the same size from the nursery rows and will soon be restored. He had two thousand arbor vitæs, from five to eight feet high, which stood thickly in nursery rows, and were transplanted to form a hedge along a driveway upon his grounds, and only five of them died. This hedge was pruned for eight years; then three hundred feet of it, making two carloads, was removed to Centre Harbor, N. H., and planted. Now, in 1891, it is one of the best hedges in New Hampshire. In another case two hundred and fifty feet of arbor vitæ hedge, eight feet high, which had been set from eight to twelve years, was taken up, carried from Reading to Lynn, and planted there in May, 1890, and nearly every tree of it is alive today. In the years 1872 and 1883 — eleven years apart — evergreen trees, and notably hedges, were sufferers from winter-killing to a remarkable extent. But the dead trees were mostly

found where the soil was very thin, over gravel, or a ledge, or where they were back of a bank-wall — that is above it — all being least supplied with the moisture necessary, but few died which stood in deep, moist soil. That most hardy native tree, so widely spread over our country, the Red Cedar (*Juniperus Virginiana*), also dies more numerously when in dry, rocky situations. In the latter fatal year, 1883, many of our native forest trees died — large white pines, oaks, etc. This disastrous effect was in each case caused by the prolonged summer and autumn drought of the preceding year, followed by an open winter, with little rain, not much snow, many periods of intense cold, and frequent extreme cold winds occurring during the winter and early spring, and therefore very deep freezing of the ground. These influences greatly weakened the vital force of all trees, as well as other vegetation, before the winter set in, and the unusual winter weather overtaxed the life force and produced the fatal results recorded. After the winter-killing of 1872, some writers declared that the arbor vitæ was not a fit plant to use for hedges in dry or open situations; that its native habitat was damp, shady forests. It is found in damp, even swampy, places, but it is also found near by, growing on the dryest rocky upland, from seeds sown by Nature, which have been wafted by the wind to points perhaps many rods from the trees on which they grew. In fact, we have no other tree, either native or foreign, adapted to so great a range of soils and other conditions as the American arbor vitæ, nor one that will endure more neglect or abuse. In connection with the statement of the winter-killing of evergreen and other trees in 1872 and 1883, it should be added that no trees were killed in places where the early snows fell and remained on the ground through the winter.

Mr. Dawson said he believed it was one duty of the Society to instruct the people in horticultural knowledge, and the object of his questions put to Mr. Manning was to draw out from him some of the facts relating to the choice of hedge plants and the necessity of a proper selection and preparation of the ground before planting the hedge, in order to ensure the permanence of benefits for which one does the work. He was pleased with the replies to his questions, and hoped they would prove valuable to those present.

Mr. Temple believed that the reason why the Arbor Vitæ is used so much is its cheapness, its easy transplanting, and its beautiful appearance when grown in a deep, moist soil. He considered it

the least valuable of all the evergreen trees in New England. The Red Cedar will flourish in light soils. The White Pine is desirable when it can be allowed to grow naturally. The White Spruce in many cases is most beautiful, especially at from ten to fifteen feet in height.

Mr. Manning esteemed the White Pine as beautiful as any of our evergreens. He did not approve of the close pruning to which many subject it, but said he had a belt of these trees, planted in 1869, which had been "shortened-in" each year, about the tenth of June, when the new growth is tender and easily broken with the fingers. Buds soon start out just back of the break and thicken up the outline beautifully. No other tree shows so complete a leaf-surface as this pine when pruned in this way, whether a hedge, belt, or single tree. Of other species, the Norway Spruce has been a universal benefactor, although an imported tree. Fifty years ago it was almost unknown here. The White Spruce is a native of our northern forests, from Nova Scotia to the Black Hills. Thirty-five years ago it was scarcely recognized by our American planters. It is specially adapted for use on the sea-shore, and may be seen close down to the rocky shores along the coast of Maine. The Red Pine is a native of New England. The Scotch and Austrian Pines are foreign trees but are desirable. All these can be shortened-in when the new growth is succulent. The Retinosporas are rich in foliage as evergreen trees, but to show to best advantage they require shortening-in, or they will disclose the dead inner leaves.

Benjamin G. Smith spoke of a plantation of evergreens in his grounds made forty years ago. It included White Pines, Scotch Pines, Hemlocks, Norway Spruces, and others. The white pines and hemlocks are still flourishing, and have attained the altitude of from forty-five to sixty feet. The Scotch pines and Norway spruces have nearly all failed.

The reading of the essay engaged the attention of the audience, by whom it was highly appreciated, and a vote of thanks to Mr. Strong for his interesting and valuable lecture was unanimously passed.

The President announced that on the next Saturday a paper on "Roses," by John N. May, of Summit, N. J., one of the most extensive and most successful growers of that flower, would be read by the author.

BUSINESS MEETING.

SATURDAY, January 24, 1891.

An adjourned meeting of the Society was holden at eleven o'clock, the President, WILLIAM H. SPOONER, in the chair.

No business being brought before the meeting it

Adjourned to Saturday, January 31.

MEETING FOR DISCUSSION.

ROSES.

By JOHN N. MAY, Summit, N. J.

Having been requested by your Committee to read a paper on this subject, I have in the following pages endeavored to say enough at any rate to open a discussion whereby I trust to learn more than I can ever hope to teach by anything that I can say. This subject has been so well and ably presented to this body so many times before, by men much better informed and more able to present it to you intelligently than myself, that I feel that I am almost an intruder here, and would certainly much rather be a listener than a talker on the subject; however, I will give my experience with the Rose, and trust you will be lenient with your criticisms.

The word Roses conveys to the rosarian a volume. It opens an immense field for discussion. The subject of raising new varieties alone, could be made most interesting if handled as it deserves to be, but at this time I fear that it would hardly be in place, neither do I think that I could under any circumstances do justice to this branch, though I certainly hope in the very near future to see American seedlings rank with the finest productions of the world, as we have every advantage for producing them,—summers that will ripen the seeds as well as any other in the world if not better; varied soils and climates, suitable for all classes of this large family, and lastly an appreciative public ever ready to admire and to buy them.

This, the queen of all flowers, has always reigned supreme for me, and will till the end of time. My first experience with the rose dates from the time I was eight and a half years old, when I

borrowed (without permission) three eyes of Souvenir de la Malmaison, then a new rose. I am sorry to have to confess it at this late day, but a clear confession, it is said, is good for the soul; anyway, having watched an elder brother doing considerable budding, and wishing to try my hand at it, I borrowed, as above stated, three eyes from my father's garden and took them to a neighboring hedge, where I found a wild rose on which I budded them. One of them grew and the next season produced three fine flowers, and from that day on, the rose (and this variety in particular) has always held a charm for me.

During all these years I have seen many, very many, changes in them, though some of the varieties that were then in their glory have not yet been eclipsed and still retain their places in the front rank. Among these are General Jacqueminot, Géant des Batailles, and many others too numerous to mention here. Among the Tea roses, Niphetos, Lamarque, Gloire de Dijon, and others still rank as first favorites; the same may be said of all the other branches of this family. But no one can gainsay that many great improvements in the family have been introduced within the last ten or twenty years; take, for instance, the magnificent Ulrich Brünner, Mrs. John Laing, Earl of Dufferin, T. W. Girdlestone, and many others of the same family. Among the Teas, the most graceful of all, combining, as this class does, elegance of form, beautiful color, and fragrance, stand preëminently Catherine Mermet and her offspring, The Bride, the latter today recognized all over the civilized world as the finest white Tea rose in cultivation; and of this year's introduction, the glorious Waban now before you, and its mother and sister grown and produced at the celebrated Waban Conservatories here in your own State. These clearly demonstrate the fact that the cultivation of the rose has wonderfully advanced within the last decade.

It may not be out of place at this time to give a few remarks on the cultivation of the rose here. Twenty years ago the principal roses grown for our markets were Bon Silène, Safrano, Lamarque, and a few others of like character. The only roses of any size then grown were Maréchal Niel and Cornelia Cook; today they are almost entirely supplanted by much superior varieties, such as you now see before you, and many others of a like size and beauty. To attain this end considerable skill has been brought to bear on their cultivation. Twenty years ago possibly five thou-

sand roses per day was the limit of the supply for New York City; now as many as fifty thousand per day can often be found there, and, according to my own estimate, based on the most careful calculation, I think I am quite within the limit in saying that it often reaches, in the spring of the year, nearly one hundred thousand per day, which speaks volumes for the growth, advancement, refinement in taste, and development of horticulture. To meet the demands of the public many changes in the cultivation have been brought about; where from the old system one rose was cut, ten at the present time are cut from the same space. Perhaps you will ask how this has been brought about; my answer is, largely by superior cultivation. Formerly they were all grown on the solid bed of the greenhouse; now they are grown on raised benches, beds, etc., and with the greatly improved style of greenhouses now at their command, growers are enabled to produce large quantities with little expense compared to that formerly involved.

When I began cultivating roses under this system many growers predicted failure; today ninety per cent of the florists in this country are growing their roses on this principle, with, of course, some modifications which experience has taught. It was formerly the practice to plant a house of Tea roses and grow them on for years till they actually died from overwork; now the general practice is to replant fine, healthy, new stock every year, or, at most, every two years. Originally the prevailing idea was that the roses must have a deep, rich border ranging from twelve to twenty-four inches in depth to produce good roses; now the finest roses in the country are produced on benches, etc., with from two and a half to four inches of soil. To keep plants in such a shallow bench constantly bearing they must, of course, have liberal treatment. After they are planted, say in July, and get fairly started into growth, they need a mulching of the best manure they can have. This induces surface root action, and these roots should never be disturbed. In the course of eight or ten weeks the plants will have absorbed the coat of mulching. Our practice is to give them a light dressing of pure, fine, ground bone, covering it with another thin coat of manure. This is feeding the plants where it will do the most good and, at the same time keep their roots where they get all the benefit of the fresh air circulating through the house. This process is repeated as often as required, and where

the plants are growing very strongly the application of other stimulants, such as liquid manure, nitrate of soda, etc., is of great benefit to them, provided, of course, that due care is used in their application. To apply such strong stimulants injudiciously, simply means ruin not only to the flowers but to the plants also. I do not hesitate to say that more plants have been killed by overfeeding than by all other causes put together. One thing should always be borne in mind in reference to plant life, and that is that it is almost identical with animal life so far as their requirements go. To maintain a plant in health and vigor requires careful and judicious feeding, just as an animal does, and the harder it works the more care it requires. Those who treat their plants or animals otherwise than reasonably will pay dearly for their pains, and reap the harvest for which they have sown.

Possibly some may doubt the soundness of such a doctrine and say, as many have said to me, "How can you reconcile this statement with our practice of growing roses in the open ground, where we use immense quantities of manure, and the more we use the better our roses grow and bloom?" Very true, they do, but the conditions are so totally different that there can be no comparison whatever. In the open ground, the action of the air, the wonderful power of absorption by the soil of unlimited depth, rains, dews by night, and sun by day, all tend to produce such a vast difference from the conditions of a greenhouse where every drop of water or particle of manure has to be brought into direct contact with the roots of the plants, that it would seem almost an absurdity to make any comparison whatever.

For the successful cultivation of the rose under glass there are a few simple rules to follow: first, to procure a suitable soil, which should be, if possible, fresh sod from an old pasture; that having plenty of grass root fibre in it is generally the best. If very heavy the addition of a liberal proportion of sharp sand will improve it, but if of a very light, sandy character the addition of some soil of a clayey nature will be beneficial for most roses. When carting together in the spring mix one part of good, clean cow manure to six, eight, or ten of soil, according to the quality of the soil. Turn it over two or three times and it is ready to put into the rose house.

The next thing is good, strong, clean and healthy plants, for without such no one need expect the best results; and the next is

to keep the house, after the roses are planted, in good condition as long as they are in it, which means all the year round. This is more important than many suppose, as no plant can reasonably be expected to thrive where dirt, mud, and decaying vegetable matter are allowed to lie unmolested for weeks or months together.

Lastly, we come to the watering and general care of the plants. On the subject of watering there is a wide diversity of opinion, mainly brought about by the different conditions of soil. The only safe guide is a careful study of the nature of the soil one has to deal with, using water in proportion to its requirements. As a general rule, a rose in full growth should never be allowed to become dust dry, neither should the soil be flooded with water till it becomes almost of the nature of mud, but for nearly all soils it is better to water the plants immediately when the soil shows the least indication of getting solid or turning slightly light in color.

For the general care and management I am afraid I should tire you all out if I even attempted to describe it in detail, but even if I did not do that I think it entirely unnecessary here—as much so as it would be for a stranger to go to Rome and tell the Romans what to do; but in conclusion permit me to say that although I firmly believe that in the past twenty years greater strides have been made in the cultivation of the rose than was ever done in double that time previously, yet I certainly think that much greater advancement will be made in the next ten years than has been done in the past twenty. Evidence of this is very clear to any one visiting the different parts of this country, and I trust that after we have all passed away the "Queen of Flowers" will still have as great a charm for our successors as she has for us. Long may she reign supreme, and this hospitable city remain the seat of her throne, to which pilgrims will ever come from all over this broad land to do homage to her majesty in all her golden glory!

Discussion.

Michael H. Norton asked whether Mr. May found a ready sale for his roses, and for what class. There is no difficulty here in selling first-class roses.

Mr. May replied that there is no difficulty in disposing of such roses as those on the table, though you cannot always get the best prices for them. There is no question that roses and other flowers

are a luxury which cannot be afforded by all. He had seen 37,000 roses of first quality in the market at nine o'clock, and at eleven o'clock only 3,000 of them were left. A year ago roses brought from fifteen to twenty-five dollars per hundred, and this year not much more than one-half as much. When the market is overstocked, the second quality have to be sold to street fakirs, and some one gets the advantage. For his part, said the speaker, he would never see a flower consigned to the ash barrel, but would rather have surplus flowers sent to the hospitals, etc. He would like to have ways and means by which growers could dispose of their surplus stock profitably; one way to prevent an overstock is to grow better flowers. Nothing injures the flower market more than to have a lady buy flowers from twenty-four to forty-eight hours old, and which fall to pieces soon after she gets them home.

Patrick Norton said that Boston people like good roses, and send the second quality to New York. He thought there was no place in the country where so many flower stores and flowers could be seen in the same space as in Tremont street. He inquired of Mr. May what are the most profitable varieties of roses and suggested the names of Ma Capucine and Mme. de Watteville.

Mr. May said there is no room in New York for poor roses. Which are most profitable depends very much on who raises them. Ma Capucine is one of the most lovely, and brings in the most money by twenty-five per cent. They have been a little disappointed in getting the Waban in New York; it has not been shown to the public in that city, though they have it in Orange, N. J., and the ladies admired it very much. Florists from New York who saw it in its home were very favorably impressed with it.

President Spooner suggested that information was desired upon the best selection of Hybrid Perpetual roses for forcing — such as Ulrich Brünner — and asked Mr. May's views upon that department of the business.

Mr. May said that the New York market is a ticklish place. General Jacqueminot was most popular for several years, and then ladies took a notion to yellow roses, and when the tide turned again in favor of red roses, a neighbor of his who had hung on to his old favorite (Jacqueminot) was the only one who had red roses. Ulrich Brünner has always been in demand in New York, but not quite so much this year as in previous years. One

grower, who had a fine house, found some difficulty in selling them. From the middle of January onward there is no difficulty in selling really fine specimens of this variety, but they must have stems two or three feet long and the flowers must be four or five inches in diameter. Mrs. John Laing is one of the most popular roses in New York; it is fragrant and sure blooming, but cannot be forced for Christmas without having a considerable portion of the crop come deformed and short stemmed.

Patrick Norton said that the Ulrich Brünner rose finds a good market in Boston.

President Spooner said that the Ulrich Brünner is fine in the garden.

William C. Strong inquired how benches answered for forcing hardy roses. His experience had been with them planted in solid beds, two, three, or four years, and he doubted whether it would pay to plant every year.

Mr. May said that the trouble comes here: if ladies get a fair rose today they want one earlier next year, and these roses cannot be forced early in a solid bed, though for March blooming it will do, and they will last for years. He had seen a greenhouse eighteen feet wide and two hundred and ten feet long, filled with General Jacqueminots planted eight or nine years, where 237 buds were counted in a space two feet square, and 37,300 buds were cut from that house as one crop.

William J. Stewart inquired what Mr. May's experience had been in the introduction of new roses.

Mr. May said that twenty-five years ago he was growing roses in England, and they used then to get their new varieties mostly from France. One autumn he went over to France and visited M. Pernet, one of the great rose growers, who showed him several new varieties to be sent to England, and some others, inferior to them, which were thought good enough for the American market. Two years ago he paid a French grower five hundred and thirty dollars for new roses, at five dollars per plant, and they all went on to the rubbish heap in six months. Once in a while we strike such a gem as Catherine Mermet, the finest of all Tea roses, but ninety-nine per cent of what we import are useless for our purpose in this country.

President Spooner inquired of Mr. May as to the value of Magna Charta as a rose for forcing in New York, and what are better.

Mr. May replied that two roses, Anna Alexieff and Heinrich Schultheis, are better, and that the former although almost as old as himself is still, as grown around New York, most prolific for early forcing. Heinrich Schultheis is one of the finest of all for this purpose, though discarded in France and England. It is every way superior to Magna Charta, which goes off in color when forced and has failed to come early. Mr. Asmus, one of the best New York growers, has failed with Magna Charta for very early, but has fine ones coming on now.

President Spooner said that Heinrich Schultheis is very fine in the garden. Anna Alexieff is not so good in the garden, being too short-petalled; its only merit is its earliness.

Patrick Norton asked Mr. May what Tea rose he considered most profitable.

Mr. May said that of Tea roses without any admixture, The Bride is unquestionably the best. Of hybrid Teas, the Duchess of Albany is best; it is of magnificent color, clean all the way through, and fragrant. If too much heat is given, it becomes purple.

John G. Barker had hoped for a paper on the rose as a bedder: he was more and more impressed with the view that we can make our gardens more beautiful with more flowering and fewer foliage plants. He had a bed last season planted with La France roses, surrounded with Hermosas and Aggrippinas; it was not as satisfactory as he hoped, but the field is still open.

President Spooner mentioned among the newer roses Gloire de Margottin, of dazzling red color, and Gloire de Lyonnaise, of lemon color, but a Hybrid Tea rather than a Remontant. He then asked Mr. May how they ranked for forcing.

Mr. May said that he felt much enthusiasm over the Gloire de Margottin when first sent out; it is of a most glorious color. As regards forcing, he was rather disappointed with it. It has a weak stem but is one of the finest for summer bedding. All like the color. Gloire de Lyonnaise was a disappointment to him.

Mr. Barker asked Mr. May if he would recommend planting La France on its own roots, or would prefer budded or grafted plants.

Mr. May replied that he is a great advocate of roses on their own roots. If a plant of La France on its own roots is killed down it will sprout again from the root, but you cannot get so

large a plant the first year as if grafted. If a lady sets out a dozen plants on their own roots she will have good bushes a dozen years hence, but if she sets out grafted plants she will have in two years a lot of Manetti stocks. A neighbor of the speaker planted thirteen years ago twenty-five La France on their own roots; they are now six feet high, and last July he cut two hundred flowers from them. The great difficulty we find with much the larger portion of the public is that they do not understand the difference between the suckers from the Manetti stocks and shoots from the graft; hence it is much better to give them plants that will not be ruined by suckers.

Frederick L. Harris said that if we import roses budded low down and plant them deep, they will stand our climate well and in one year give more flowers than plants on their own roots will give in two years. Once in a while we get suckers from the stock, but anyone who studies the character of the shoots can remove them. The speaker would not recommend purchasers to buy any roses budded on stems five or six inches high.

President Spooner said that he is a strong advocate for budded roses, if they are budded in the right place and properly grown. They should be planted so as to have the stock three or four inches beneath the surface, and the bark should be raised a little on each side to enable them to emit roots more readily; you will then get a better plant in one year than in three or four years if they are on their own roots. The Manetti stock is the best for light soils; the brier sends up too many suckers. All the best roses that come to our shows are from budded stocks. He does not want to wait four or five years to get a strong plant.

Among the best summer roses are La France, and, for later, Fisher Holmes or Prince Arthur (the last named a seedling from General Jacqueminot), Heinrich Schultheis, and Lady Helen Stewart. For white, Merveille de Lyon and Mabel Morrison. Gloire de Lyonnaise throws up fine shoots. Madame Victor Verdier is a grand garden rose. Alfred Colomb is of globular form and high-scented. Mme. Isaac Pereire, a Hybrid Bourbon, is a good climbing variety. Earl Dufferin has a full flower and is destined to be one of the best. Marshal P. Wilder is too much like Alfred Colomb. Mme. Montet is a free flowering variety and of very fine color. Mme. Gabriel Luizet is very desirable for this purpose. Mrs. John Laing is almost as free flowering as General Jacqueminot.

Mrs. H. L. T. Wolcott asked the president if when budded plants are set out as recommended by him, you do not virtually have a plant on its own roots after a year or two, to which he answered, "yes." Mrs. Wolcott went on to say that a good while ago she planted budded roses under the direction of the late Hermann Grundel, who advised her to lay them down so that they would root from the grafts, and she saw them twenty years afterwards, and never saw better bushes or a better show of flowers.

John S. Martin said that when he wished for bedding roses many years ago, he asked Ex-President C. M. Hovey, as to the relative value of those on their own roots, and those budded on a stronger stock. His answer was: "Never buy budded roses to plant in the garden," and Mr. Martin now thought that was the better rule.

Patrick Norton said that while La France is considered a good rose, the Duchess of Albany is higher colored, and he advised those present to recommend to their friends to give it a trial for outside cultivation.

On motion of William C. Strong a vote of thanks to Mr. May for his instructive and valuable lecture was unanimously passed.

O. B. Hadwen, Chairman of the Committee on Discussion announced for the next Saturday, a paper upon "Insects and Fungi Injuring Our Fruits, and Remedies Considered," to be read by the author, Samuel T. Maynard, Professor of Horticulture at the Massachusetts Agricultural College, Amherst.

BUSINESS MEETING.

Saturday, January 31, 1891.

An adjourned meeting of the Society was holden at eleven o'clock, the President, William H. Spooner, in the chair.

E. H. Hitchings moved that a committee of three be appointed by the Chair to nominate a Committee on Window Gardening, of seven members. The motion was carried, and the Chair appointed, as the Nominating Committee, Nathaniel T. Kidder, Arthur H. Fewkes, and Joseph H. Woodford.

Adjourned to Saturday, February 7, 1891.

MEETING FOR DISCUSSION.

Insects and Fungi Injuring our Fruits, with Remedies Considered.

By Samuel T. Maynard, Professor of Botany and Horticulture in the Massachusetts Agricultural College, Amherst.

At this season of the year fruit growers, market gardeners, and farmers are making their plans for the work of the coming season, and in their estimate of the income they hope to derive from their crops, they reason, perhaps, something like this: One has one hundred apple trees or one thousand grape vines, and if the apple trees are twenty years old they should yield at least three barrels per tree, or the vines, if five years old or more, should yield ten pounds per vine, or a total of ten thousand pounds, and reckoning the prices at the average for a decade he gets upon paper very satisfactory returns.

But how many of us make our plans for the coming year with any degree of certainty that the results will give us even a fair return for labor and interest on the capital invested? We know too well from bitter experience the chances the crops must run with frosts, with storm and wind, with drought and wet, and above all with insects and the many blights, rusts, mildews, rots, and smuts, that feed upon and destroy the plants we cultivate.

We have the authority of the Entomological Bureau of the United States Department of Agriculture, for the statement that the loss by insect depredations to the farming interests, including all its branches, for the past year amounts to four hundred millions of dollars. This almost inconceivable amount of money from the destruction of our crops in one year! Yet who that has experienced the loss of his grape crop by mildew or rot, his apples by the scab, his pears by the scab and blight, his plums by the black wart and rotting of the fruit, his cherries and peaches by rotting of the fruit, his strawberries by the leaf blight, his potatoes by the potato rot, his oats and grasses by the rust, his cabbage crop by the club root, his celery by the leaf blight, his lettuce by the mildew, and his cuttings and plants under glass by damping off, will doubt that our losses are often as great from parasitic or fungous plant growths as from insects, if not greater!

It is seldom that we get a crop of any kind without a valiant fight for it. Fortunately we have learned to feel that we are greater than the foes that assail us, and that with each new insect

or fungous pest soon comes a remedy with which we may protect ourselves if we will.

When the Colorado potato beetle first made its appearance among us we thought we must give up this important crop, but now we find that by proper vigilance the crop can be successfully and profitably grown. So when we are almost discouraged in our attempts to grow fruit or other farm or garden crops, relief seems near us and we feel sure that we shall be able to combat all foes.

It is to the consideration of some of the most injurious insect and fungous enemies and their destruction that I invite your attention this morning.

In the growth of the apple we have to contend with the Codling Moth (*Carpocapsa pomonella*), the Canker Worm (*Anisopteryx vernata*), the Tent Caterpillar (*Clisiocampa Americana*), the Apple Maggot (*Tripeta pomonella*), and the Plum Curculio (*Conotrachelus nenuphar*) among the insects, and the Apple Scab (*Fusicladium dendriticum*), which also produces the Leaf Blight, among the fungi.

With the pear we must contend with the Codling Moth, the Plum Curculio, and the pear tree Psylla (*Psylla pyri*) among the insects, and the pear leaf blights (*Entomosporum maculatum* and *Fusicladium pyrini*), and the so-called Fire Blight (*Micrococcus amylocorus*).

The plum is attacked by the Plum Curculio — about the only insect seriously injurious to it — and the Plum Wart or Black Knot (*Plowrightia morbosa*), the Leaf Blight (*Puccinia prunispinosæ*), and the Brown Rot of the fruit (*Monilia fructigenea*).

The peach is injured by the Borer (*Ægeria exitiosa*), the Plum Curculio, and the Brown Rot of the fruit.

With the cherry the Plum Curculio is very injurious and the Rose-bug (*Macrodactylis subspinosa*) sometimes destroys the leaves.

The grape perhaps has the greatest number of fungous foes, and among the most injurious are the Powdery Mildew (*Peronospora viticola*), which is also the cause of the Brown Rot; the Black Rot (*Læstelia Bidwellii*) and the Rose-bug and Phylloxera (*Phylloxera vastatrix*) among insects.

The strawberry is injured by the Leaf Blight (*Sphærella fragariæ*) and the Crown Borer (*Tyloderma fragariæ*).

For the destruction of the larger number of this great host we have two remedies, the arsenites for the insects and copper salt in solution for the fungi.

Perhaps we can best get at the most approved methods of using them by considering the enemies of each fruit by themselves.

THE APPLE.—The codling moth lays its eggs in the blossom end of the apple soon after the petals fall and continues to lay them for a period of perhaps two weeks or more. In some seasons and in some sections a second brood of eggs is laid by the perfected insects from the first brood.

The tent caterpillar and the canker-worm feed upon the foliage, beginning to work as soon as the leaves unfold, while the plum curculio feeds upon the foliage and perhaps the fruit, laying its eggs in the crescent shaped cut it makes in the skin.

These pests may all be destroyed by the use of the arsenites—Paris green, London purple, and white arsenic. To destroy the tent caterpillar and the canker worm we must make the application just as soon as the leaves unfold, and for the codling moth and the curculio as soon as the petals drop.

These applications must be made at intervals of from one week to twenty days, according to the weather. If there should be no rain after the first application for the tent caterpillar and canker-worm, another application will not probably be needed until the one made to destroy the plum curculio and the codling moth; then the applications should be made at intervals of from ten to fifteen days, up to the first of July.

During this time we must also be combatting the fungous growths, which under favorable conditions may begin work very early in the season. The apple scab is a minute plant that grows upon the surface of the apple leaf and fruit, and, while not penetrating the tissues very deeply, stops the growth at the point attacked and we have distorted or gnarly apples resulting from its early attack; or scabby, spotted apples when it appears later in the season. Its effect upon the leaf is, if in large numbers, to destroy its functions and it soon falls, or if only a few are found on a leaf it simply looks a little yellow and the whole tree has an unhealthy appearance.

This fungous growth, like most other parasites attacking our fruits, develops under conditions of warmth and moisture. The spores or seeds, which are produced in large numbers, are so minute that they may be carried long distances by slight movements of the air, and coming in contact with their host plant, the apple, under favorable conditions they grow very quickly.

In a cool dry season, there is very little development of rusts, blights, and scabs, so destructive in a moist warm one. For the past two years fungi of all kinds have developed in large numbers, and many kinds of plants have been seriously if not permanently injured by their attacks.

The past season the apple scab was so abundant that many trees which blossomed and set a large crop of fruit were so injured by it, that they could not perfect their crop. Upon a large tree in front of the house I occupy, so much of the scab appeared that the leaves were dropping nearly all summer and the lawn had to be raked several times to get rid of the litter.

To destroy this parasite, solutions of copper have been found effectual, either in the form of the Bordeaux mixture, ammoniacal carbonate of copper, or simple carbonate of copper solutions.*

While alone the ammoniacal carbonate of copper has proved the most effectual, unfortunately it cannot be used with Paris green or other arsenites, and if we wish to reduce the cost of the remedy for both insect and fungous pests to the lowest figures — and all know how little margin for profit there is even when we do not have this difficulty to contend with — we must combine the two remedies and apply them at one operation. With the Bordeaux mixture and the simple carbonate of copper solution we can do this, and without danger of injury to the foliage.

It has been found by experiments made at several of the state stations that Paris green and copper solutions can be used with lime mixtures at the rate of from 1 lb. to 100 gallons of the mixture, to 1 lb. to 50 gallons, without injury, some even claiming as concentrated a mixture as 1 lb. to 25 gallons. We also know that neither Paris green nor sulphate of copper solutions can be safely used upon the foliage of our fruit trees, in the degree of concentration required to destroy the above mentioned foes, without serious injury to the foliage.

I am confident that the reason why the use of Paris green has been so unsuccessful in many cases for the destruction of insect life, is that we have been unable to use it in a form concentrated enough to reach all parts of the plants without injury. This will also apply, in a measure, to the fungicides.

For the purpose of destroying both insect and fungous pests we must make an application of the simple solution of sulphate of

*See formulæ, page 65.

copper, called by the French *eau celeste*, to the twigs and branches before the leaves appear, to destroy any germs of the scab that may be lodged in the crevices of the bark; then as soon as the leaves have unfolded the lime and Paris green mixture must be applied for the tent caterpillar and the canker-worm, and as soon as the petals have fallen the second application should be made for the codling moth and plum curculio. This application must be repeated at the proper intervals — of one week to twenty days — according to the weather, until the first of July. After this, the Paris green not being needed, the ammoniacal carbonate of copper may be used. The latter application is to be preferred from the fact that it does not disfigure the fruit, while if the Bordeaux mixture is used late in the season, it adheres to the fruit so as to injure its sale unless washed. No substance has been found that can be used in this way and at the same time for the apple maggot, a little insect that in many localities and upon some varieties, is doing more injury even than the codling moth. The destruction of the fruit before the maggot escapes is the only remedy yet suggested that promises to be of any value.

The Pear.—The insects attacking the pear that can be destroyed by the arsenites are the codling moth and the plum curculio, and the fungi that can be killed by copper solutions are the pear leaf blight (*Micrococcus amylovorous*, Burrill), and the pear scab (*Fusicladium pyrinum*). The pear leaf blight is another parasitic plant somewhat like the apple scab, but more minute and perhaps working deeper into the tissues of the leaf, often causing all the leaves to drop from the trees. This fungus also causes the scab and cracking of the fruit so common on the White Doyenne and Flemish Beauty. For the insects Paris green is effectual, and the Bordeaux mixture has proved as efficient for the pear fungus as for the apple scab. While the fire-blight (so-called) is not of such a nature as to be affected by the outward applications of fungicides after it has attacked the tree, we believe that this mixture will destroy any germs with which it comes in contact, and that by careful attention to the proper condition of soil, manuring, and cultivation we may very largely overcome this most destructive disease.

The Plum.—The plum curculio, the black wart of the tree, and the rotting of the fruit have been found to succumb to the Bordeaux mixture and Paris green.

The only trees on the college grounds upon which the fruit was not stung by the curculio or that did not rot as soon as it approached

maturity, were those treated with the above combination, and as other stations report similarly favorable results we feel warranted in urging its general use. The sulphate of copper solution should be applied to the branches before the leaves unfold, to destroy any germs or spores of the leaf blight or plum wart that may be present, and then from the time the blossoms fall until the first of July the combined mixture should be used. After this, either the Bordeaux mixture or the ammoniacal carbonate of copper alone may be used. The latter will probably be the most satisfactory as it does not disfigure the fruit.

The plum wart we feel sure was largely prevented from developing by this treatment, but the few warts that may secure a hold on the branches can certainly be destroyed by the kerosene paste.* This should be applied with a brush in order to keep it from the new bark, which it would destroy.

The Grape.— In the college vineyard the past season the benefits derived from the use of the Bordeaux mixture — and we have like reports from others wherever used — were such that there seems to be but little doubt that this is a reliable remedy for about all of the fungous diseases of the vine. The great objection to its use is that it remains upon the fruit when ripe if applied late in the season. But after the work of the rose bug has ceased I see no reason why the ammoniacal carbonate of copper may not be used with equal effect.

In our experiments the destruction of the rose-bug by the use of Paris green was not fully demonstrated, but other reports are more positive; and from the light we did gain by our work we believe that, by the use of a more concentrated solution, which it has been proved we can apply with the Bordeaux mixture, this troublesome pest must succumb to this treatment.

The sulphate of copper solution was applied to the vines before the leaves unfolded and the Bordeaux mixture at intervals of from one to three weeks up to July 28th. Paris green was used only from the time the rose bugs made their appearance to about the first of July.

The Strawberry.—During the spring and early summer, strawberry leaves in some localities are seriously injured by a small brown beetle that feeds upon them. This little beetle is the crown borer, the larvæ of which are at work during the summer eating

*See formulæ, page 65.

the crown of the plant and the larger roots. A serious disease, known as the leaf blight, also attacks the foliage at about the time the fruit ripens, and when both of these agencies are at work it is a difficult matter to get rid of the trouble. It is thought that Paris green will destroy the crown borer, and it is certain that the Bordeaux mixture will lessen the injury caused by the blight, if not wholly prevent it.

An application of the combined mixture should be made as soon as the leaves begin to increase in growth in the spring, and another a little while before the blossoms open. Neither the Paris green nor the Bordeaux mixture can be safely applied again until after the fruit is gathered. By this time the crown borers have ceased their work and only the latter need be used until August, when the beetles again appear and Paris green must again be used.

The cutting and burning of the leaves of the old strawberry bed or their destruction by dilute sulphuric acid, as recommended by some, is undoubtedly valuable, but the Bordeaux mixture is thought more effectual. If one fears to use the Paris green, hellebore may be used, as it is reported as being an effectual remedy.

FUNGICIDE FORMULÆ.— *Bordeaux Mixture.* Dissolve 6 lbs. of sulphate of copper in 2 gallons of hot water; slake 4 lbs. of fresh lime in water enough to make a thin lime wash; when both are cooled pour together, stirring thoroughly; then dilute to 22 gallons and it is ready to apply.

Ammoniacal Carbonate of Copper. Dissolve 3 oz. of precipitated carbonate of copper in 1 quart of ammonia (strength 22° Baumé), and dilute with 22 gallons of water.

Eau Celeste. Dissolve 1 lb. of sulphate of copper in 25 gallons of water.

Modified Eau Celeste. 2 lbs. of sulphate of copper, $2\frac{1}{2}$ lbs. of carbonate of soda, $1\frac{1}{2}$ pints of ammonia (22° Baumé), and 22 gallons of water.

Kerosene Emulsion. 1 lb. of common soap dissolved in hot water, 1 gallon of kerosene; stir or churn together until a smooth butter-like substance is formed; then dilute with 25 to 50 parts of water.

Kerosene Paste. Mix kerosene with any fine, dry material or pigment, forming a thin paste or paint; apply with a small brush.

INSECTICIDES.— In the discussion of insecticides I have mentioned only Paris green, from the fact that reports from all sources

agree that it is less injurious to plant foliage than London purple, and white arsenic is unquestionably too dangerous a material to have about, from its color not being distinguishable from that of many harmless substances.

Pumps.— Many forms of pumps are now to be found in the market adapted to applying the fungicides and insecticides mentioned. Of those most in use perhaps the "Field's Perfection," made at Lockport, N. Y., the "Gould," made at Seneca Falls, N. Y., the "Douglas," made at Middletown, Conn., and the "Nixon," made at Dayton, Ohio, are among the best. These are made to be attached to a cask which is mounted on a stone boat or wagon. The knapsack pumps which are serviceable for small garden plots and small vineyards would be more useful if some means were provided for filling without removing from the back every time. The "Excelsior," recently advertised by William Stahl, of Quincy, Ill., is made, I understand, after the design sent out by the United States Department of Agriculture. This is constructed after the pattern of those used by the French in treating their vineyards, but will not be largely used by Americans when the horse can be made to do the heavy work of carrying the liquids.*

Nozzles.— A nozzle to distribute such liquids as the Bordeaux mixture must have an adjustable opening at the end. Among those to be found in our markets are the "Perfection," sent with the Field pump, the "Nixon," the "Cyclone," and the "Vermorel." Professor Bailey, of Cornell University, has contrived a clamp which is attached to the end of a common rubber hose, by the pressure of which the size of the opening is quickly adjusted. Whatever nozzle is used it is found that it must be attached to a long pole to distribute the liquid most evenly at the top of large trees.

Notes.— Many interesting facts have been brought out in the work of the Experiment Stations of the country which could not be referred to in the previous discussion, and I therefore introduce them here, condensed under the heading of "Notes."

It seems pretty well settled that, of the arsenites, Paris green gives the best results as an insecticide.

That the longer the mixture stands the greater is the injury from soluble arsenic.

*Since this paper was read further trial of the Stahl or Excelsior pumps has proved that some of them, at least, are of no value.

That the peach, plum, and cherry are more susceptible to injury than the apple and pear.

That the injury varies with the variety, some being much more susceptible to injury than others.

That the leaves when young are less injured than when fully developed, and those on weak trees more than those on vigorous, healthy ones. Young leaves are covered with a natural bloom, which wears off as they increase in size and their tissues become more toughened.

That Paris green cannot be used alone with safety stronger than 1 lb. to 350 gallons, but with lime mixtures it may be safely used at the rate of 1 lb. to from 100 to 25 gallons of water.

That the foliage is most injured when kept constantly wet by light rains or foggy weather, but that heavy rains lessen the injury, the least harm being done in pleasant weather when the liquid dries off most rapidly.

That the time of day when the application of either insecticides or fungicides is made is unimportant.

The conclusions of this paper I have arrived at after a careful summary of the experiments made at the College and a careful study of those of all of the stations of the country and I feel confident that as soon as we master the details of the application of the two great remedies, Paris green and the copper solutions, so as to understand the exact time to apply them and the quantity to use under varying conditions, we shall be able to control the insects and fungi attacking our fruits as well as we now control the "potato bug."

Professor Maynard's essay was illustrated by many mounted specimens of fungi which destroy fruit plants; also by several forms of nozzles made for use in applying liquid fungicides and insecticides to infected trees, shrubs, etc. The reading commanded the close attention of a larger audience than had been present at any preceding meeting this season.

Discussion.

William D. Philbrick questioned the essayist concerning the disease affecting the violet.

Professor Maynard replied that the violet disease is unquestionably of fungous origin; that we often find masses of dust-like spores upon dying and dead leaves, but it cannot be determined from this fact alone whether that fungus caused the disease which destroyed the leaf. Mildews of this character generally develop on decaying matter.

Mr. Philbrick asked whether it could be easily decided what fungus causes the disease and how it is disseminated.

Professor Maynard replied that two species of fungus are found on the leaves of violets, but apparently the disease is caused mainly by one. The spores when mature are exceedingly minute — so light as to be thrown off by the slightest motion of the leaf, and remaining suspended in the air a long time they are widely distributed by the varying currents of the wind.

Benjamin P. Ware asked if he understood the essayist aright, that one pound of Paris green to three hundred and fifty gallons of water was generally the proper mixture to destroy insects without injury to the foliage of trees. In his trials of this remedy he had used only sixty gallons of water to one pound of Paris green, and had seen no injury come to the trees.

Professor Maynard said there are many reasons for variations in experience — different conditions of seasons, the weather, the quality of the Paris green, and the chemical character of the water. He had found that one pound of Paris green to three hundred and fifty gallons of water had given fairly good results on an average. In some cases injury had been done to the leaves by that mixture, but numerous experiments, and analyses of the compound as prepared at different times, had led to the adoption of that formula. If the mixture stands a while unused, some of the arsenic may be dissolved in the water and thus render it unsafe.

Mr. Ware said he had tried to get pure Paris green. Possibly what he had used might have been adulterated, inasmuch as the large quantity used did no harm to the trees, but it destroyed the insects. He had supposed that Paris green was insoluble, and that in the mixture it was only held in suspension.

Professor Maynard said that water might contain some ammonia, which would tend to free a portion of the arsenic; this would dissolve readily in the water and the mixture would become harmful.

President Spooner referred to the Black Spot fungus (*Actinonema rosæ*, Fr.) which appeared on the rose leaves in the Durfee Plant House, on the Agricultural College grounds at Amherst, as reported in Bulletin No. 6 of the Hatch Experiment Station, and asked about the sequel of the treatment with the eau celeste compound.

Professor Maynard did not know that any black spot on the rose leaves had appeared in the Durfee Plant House since the use of evaporated sulphur was adopted. He believed the fungus was entirely destroyed by that treatment.

William C. Strong called for further information as to the treatment of the Black Wart with kerosene.

Professor Maynard said that the black wart should be treated at once upon discovering its presence, by an application of the Bordeaux mixture, and followed up by another application of the same remedy every two weeks, as a new crop of the fungus spores (*Plowrightia morbosa*) will generally mature in that time, and continued until no evidence of fresh spores can be found. If applied in the spring, the eau celeste liquid will destroy these germs, but if they become established the knife will have to be used, and the wounds thus made should be covered with a coat of paste, composed of some ochre or whiting, or any other of the dry, earthy pigments, mixed thoroughly with kerosene to a consistency that can be readily spread with a brush over the exposed surface without running beyond the limits of the wound. This would protect the surface from atmospheric action, kill the wart, and prevent the development of any fresh spores which might fall upon it. He had visited a plum orchard in Lancaster, which was literally breaking down from the development of black wart. In that case nothing could be done but cut off all the tops. Should a dressing of hen manure and ashes be applied to the land the trees would, in due time, produce new and healthy tops. Allusion was also made to the wild choke cherry as a much neglected propagator or nursery of the black wart.

Nathaniel T. Kidder called attention to Professor Maynard's remark about the wild cherry trees, which are infected with not only black wart but sundry insect pests. He wished to impress this fact upon the minds of all present, and would like to encourage a war of extermination against the wild cherry because of its availability for the multiplication of these enemies to fruit production.

Mr. Strong asked about the extent to which cutting out the black wart should be carried.

Professor Maynard said the diseased portion should be cut out clean. The rootlets (mycelium) penetrate deeply into the wood, and if not all removed the disease continues to extend; therefore a partial cutting is a waste of time.

Mr. Strong thought that if that were the case, prevention, if possible, would be much better than cure.

F. L. Temple inquired if the fungicides are not injurious to the trees.

Professor Maynard replied that it is only when the remedies are too strong that any harm is done to the trees.

Mr. Temple related an experience in treating *Prunus Americana* with salt. The black wart was cut out and the wound covered with cloth which was first dipped in pickle from a pork barrel. The wetting was repeated often and followed up several weeks with such good effect that the trees were kept in bearing condition for years by this method.

Mr. Philbrick spoke of a rust which had affected the leaves of maple trees over a considerable area in this State, and asked for information about it.

Professor Maynard replied that the rusts or blights of many forest trees are of similar nature to the apple scab, and referred to the "Journal of Mycology," Vol. 2, page 13, 1886, where the rust mentioned by Mr. Philbrick is shown to be caused by *Phyllosticta acericola*, which was found in New England in 1874, and in various other parts of the United States at sundry dates since; that it attacked Maples, and that other somewhat similar fungi affected Poplar trees and some other sorts. The effect of their presence in all cases is much like that of the apple scab.

William H. Hunt asked if white arsenic is just as good as the crude form for use as a remedy.

Professor Maynard replied that white arsenic is just as efficacious as the other forms mentioned; but if the preparation were allowed to stand a while after being mixed, the arsenic, by the evaporation of the liquid, would become very much stronger in proportion and the longer it remained unused the greater would be the proportion of arsenic. Then, if used again without the necessary addition of water, it would be liable to injure the plants, and might destroy all the foliage. But another objection to the use of white arsenic for this purpose is that it bears so close a resemblance to other and harmless substances that there is danger in having it about the house, where it may be used in place of one of those, and produce fatal effects. Paris green mixtures also become injurious by standing unused, and the more so in proportion to the time they stand.

Francis H. Appleton asked if the blight on birch trees is of insect or fungus origin.

Professor Maynard said that many birches turned brown last autumn from the work of a minute insect which is protected by a shell, probably of its own making. This enemy has increased to abundance during the last two years, but has not yet been identified. Its work was manifest generally through the eastern part of the State, but not so much in the western counties. He would suggest that probably Paris green would destroy the worms attacking the birch trees.

Mr. Strong asked if the remedy would be adapted to rid the trees of the red spider which now destroys their beauty.

Professor Maynard thought the sulphur and lime solution would suffice to remove the red spider. It punctures the leaves and sucks out the sap. Arsenites destroy only those insects which eat the foliage, but the kerosene emulsion, the formula for which is given in the essay, might also be an effective remedy for the insect injuring the birch.

O. B. Hadwen had noticed the discoloration of white birches at the north of Worcester, and beyond Concord, N. H., and west to near Springfield, but not much at more southern points. If the ravages of the new comer keep on, great injury will be done to our fine cut-leaved birch trees.

At the conclusion of the discussion a vote of thanks to Professor Maynard for his able, interesting, and very instructive essay was unanimously passed.

The Chairman of the Committee on Publication and Discussion announced, for the next Saturday, a paper upon "Chrysanthemums," by John Thorpe, of Pearl River, N. Y.

BUSINESS MEETING.

SATURDAY, February 7, 1891.

An adjourned meeting of the Society was holden at eleven o'clock, the President, WILLIAM H. SPOONER, in the chair.

The Committee appointed at the last meeting to nominate a Committee on Window Gardening, reported the names of the following members:—

Mrs. Henrietta L. T. Wolcott, *Chairman*,

E. H. Hitchings,	Edmund Hersey,
Henry L. Clapp,	George A. Parker,
M. B. Faxon,	Miss Mary L. Vinal.

The report was accepted and the persons named therein were unanimously elected.

The Committee appointed on the 3d of January to nominate a candidate to fill the vacancy in the Committee on Vegetables, reported the name of Joseph H. Woodford, who was unanimously elected.

The following named persons having been recommended by the Executive Committee for membership in the Society were upon ballot duly elected.

William P. Park, of West Boxford.
Warren Howard Heustis, of Belmont.
Charles W. Prescott, of Concord.
Charles E. Weld, of Roslindale.

Adjourned to Saturday, February 14.

MEETING FOR DISCUSSION.

Chrysanthemums.

By John Thorpe, President of the American Chrysanthemum Society, Pearl River, N. Y.

If it had been predicted ten years ago that the Chrysanthemum would attain to the position it now holds, it would have been said that such a thing was impossible. Let us for a moment look about for the cause of the chrysanthemum's popularity. It did not come in a night, a week, or a year, but it has taken twenty years to bring about what we are enjoying today.

When Robert Fortune sent to England his first consignment from Japan it was there that the first spark was kindled. An intelligent minority were far-seeing and wise enough not to be disheartened or put down by the many who were wedded to the paucity of form and color possessed by the puritanical varieties of

that day. Furthermore, that minority was not confined to one house, one city, or one continent. Many members of your Society—the greatest horticultural society in the world—happily belonged to Fortune's minority, one of the most prominent being your Ex-President, Dr. Henry P. Walcott. It was the work of time, love, and the expenditure of much money, to spread before the people the feast which they now annually enjoy, but everything comes to him who waits.

It is but a few years since chrysanthemum shows were unknown except perhaps in your city, New York, and Philadelphia. The numerous exhibitions held last season, numbering nearly fifty, are proof of the progress the chrysanthemum is making.

I do not intend to give you the routine of general cultivation, as I am sure many of you know how to grow chrysanthemums better than I do. But there are a few points to which I desire to call your attention.

One is, never neglect a chrysanthemum. This ought to be written very plainly on every plant. No plant can be as successfully cultivated in as many forms; it matters not whether the plants are grown as massive specimens, tall standards, or on benches a few inches apart. If they receive the proper attention the result is always commensurate. The thousands of plants that are now required to produce fine flowers for sale have brought about a system differing entirely from that followed previously.

The plants are grown continuously under glass and are treated as follows. Good, strong cuttings are rooted in May. The plants are potted into thumbs, from thumbs into three-inch, and from three-inch into five-inch pots. In June or the early part of July they are planted in benches, from sixteen to twenty-four inches apart, according to size, the soil being the same as for roses and from four to six inches deep. They are pinched back so as to give from four to six shoots, carefully trained and well supported, syringed often, and watered carefully. Air is given at all times, provided no draught is created. The buds are selected at the end of August or the beginning of September, one bud to each shoot; the rest of the buds are rubbed off, and all superfluous wood is removed. As the plants grow they are tied, and as soon as the buds are well in sight the feeding with liquid manure commences. It is necessary to state that such plants require at least five feet of head room; otherwise they have to be bent down.

Some cultivators do away with benches altogether, and plant in the ground. Others do not plant until August, using smaller plants, which they place closer together — often not more than six inches apart. During the flowering season air is kept on at all times, and fire heat enough to keep the temperature at fifty degrees at night.

The grouping and classification of varieties is now in a somewhat ambiguous and unsatisfactory state, but is worthy of serious attention. Exactly how to bring about what is required is a difficult matter, owing to the continual addition of new forms and the merging of one section into another, thus often obliterating the lines of demarcation.

Perhaps as a temporary relief the best thing to do is to accept the classification (as far as it goes) of the National Chrysanthemum Society of England, which is as follows:

Section I. Incurved, of which George Glenny and Queen of England are the type.

Section II. Japanese. This is divided into three groups:

Group 1. Flat petals; type, Peter the Great.

" 2. Petals quilled; type, Bronze Dragon.

" 3. Petals fluted; type, Cossack.

Section III. Japanese incurved. Type, Comte de Germiny.

Section IV. Japanese reflexed. Type, Elaine.

Section V. Reflexed. Type, King of Crimsons.

Section VI. Large Anemones. Type, Georges Sand.

Section VII. Japanese Anemones. Type, Fabian de Mediana.

Section VIII. Pompons. Type, Bob.

Section IX. Pompon Anemones. Type, Antonius.

Section X. Single Flowers.

But this does not cover all the ground; Mrs. Hardy and her type have no place, neither has Violet Rose nor Ada Spaulding.

The raising and distribution of seedlings has assumed proportions beyond conception, from which we may expect startling results. Of American raised seedlings to be distributed this spring, the number is over one hundred and twenty. Taking into account the number distributed last year, out of which there are at least fourteen that rank among the very finest, we may expect that at least twenty-four of this year's introduction will be among the best at next flowering time.

It is hoped that due care will be exercised in the awarding of medals and in the granting of certificates, now that there are so

many to select from. A rule should also be made absolute, that neither a medal nor certificate shall be given to any seedling unless it is named, and that this name is not to be changed. The giving of medals and certificates to seedlings bearing numbers only, is calculated to mislead and confuse. I do not wish it to be understood that I object to the exhibition of seedlings under numbers when they are placed there for exhibition only, but as soon as they enter into any competition let them be properly named.

It is also hoped that in making awards to seedlings neither Anemones, Pompons, nor any other type will be overlooked or discarded, as it is in the varied forms that so much interest lies.

It has been asked whether very early kinds are desirable. My reply is that with one or two exceptions the very early varieties we now have are not of great merit. They lack either vigor, distinctness, or brilliancy, all of which they should possess as decorative plants. But suppose we have presented to us a group of robust, compact growth, bright and decidedly healthy foliage, flowers of the type of and as large as President Hyde, and in desirable colors, flowering from the fifteenth of September — what could be more attractive? We are promised such a group and they will be heartily welcome.

Just as long as there are produced new types and new shades of color, just so long will the interest in the cultivation of the chrysanthemum be kept up. We have but to recall the interest which that beautiful variety, Mrs. Hardy, and her followers created. Now we are evolving a type which is certain to create further interest. Its distinctive characteristics are the marked extension of the ray florets beyond the body outlines of the flower. Examples are Violet Rose, Ada Spaulding, and Flora Macdonald. The ligulate petals are broad, numerous, and incurving. Perhaps a good name for this type would be "American." Yet another type, the original of which is Laciniatum, one of Fortune's importations from Japan, is being developed in all colors and in the largest sizes. Still another form, distinct in every particular, is one where the flowers present two distinct surfaces, the upper surface being composed of broad reflexed petals, and the lower surface being a mass of narrow segments which extend from either side of the base of each floret. These are only a few of the newer forms waiting to be brought forth.

That there is a constant addition to the already numerous shades and tones is known to close observers. The pink shades are each

year becoming clearer; the reds and crimsons are getting brighter. The once undefined shades of purple are decidedly more brilliant and effective. As to yellows and white we are yearly presented with something different from what we previously had.

Coming now to the possibility of a blue chrysanthemum, let me say that I am convinced we shall have shades of blue as certainly as we now have blue shades in pansies. It is within the memory of a great many of us when there were neither red nor blue shades as presented in the pansies of today.

Grave doubts have been expressed whether actual cross-fertilization has ever been accomplished artificially in chrysanthemums. I can say without the shadow of a doubt that it has been, but I do not say that every variety can be so crossed. All flowers intended to be fertilized must have their petals clipped off close to the stigma before the flower opens. This admits of the development not only of the stigmas but of the ovary also. Some varieties will be found entirely sterile; Grandiflorum has never yet given me a single seed, and, so far as I am able to tell, the pollen grains are sterile also. Where cross-fertilization is carefully and successfully done, fewer seedlings give better results.

The possibilities to be obtained by selection are just as great with the chrysanthemum as with any other class of plants or animals. In fact, wherever seedlings are raised it is by selection that we retain any varieties, whether they be large flowered or small, tall plants or dwarf. It is by selection that after a few generations each raiser creates a standard of his own, by which his productions are known. It is simply this: You have different material and different ideas from mine; consequently the result must be different.

From a strictly commercial point of view the chrysanthemum has become of national importance.

The annual sale of plants is now over a million. The number of cut flowers that were sold in open market last year is almost incredible, many of the best flowers realizing fifty dollars per hundred at wholesale. Some of the large growers around New York had as many as fifty thousand flowers in sight at one time, averaging a great deal better in quality than many of the winning flowers that were to be seen on the exhibition tables but a few years ago.

It has been said that the chrysanthemum flowers interfere with the sale of roses and carnations, but I notice that nothing interferes with chrysanthemums in their season.

Discussion.

Leverett M. Chase asked about the character of the new, early blooming varieties advertised in Europe, particularly those raised by M. Delaux, in France; also how they thrive in America,—a point of importance to those who have no greenhouse.

Mr. Thorpe replied that with one or two exceptions, the early flowering varieties raised in Europe have not given satisfaction here, owing to their being unable to withstand the excessive heat of our summer. It is reasonable to expect that a few of the many early varieties offered by Delaux, will succeed here, but how many will have to be proved by trial. The moist and temperate climate of France and England, where chrysanthemums do well out of doors, is very different from ours. If we desire to succeed in raising a series of early flowering varieties to withstand the variations and vicissitudes of our climate, we must raise our own seedlings and save none but those that stand the ordeal to which they are subjected here. In other words they must be to the manor born.

M. Delaux claims for his set that they will begin to flower as early as the fifteenth of July. We have already several pompons that would flower by that date provided that they could be made to grow. The speaker thought that what we require is a series, beginning to flower not earlier than the first of September, having the characteristics mentioned in the essay. M. C. Nichols is a variety having some of these good points; it is a sturdy grower and has thick, leathery leaves; the flowers are of medium size, rather undecided in color, and bloom about the fifth of October. Harvest Queen is a good white, as is also Mlle. Lacroix; these flower about the fifteenth of October. The flowers of the last two are much better when grown under glass.

Richard T. Lombard inquired what Japanese variety Mr. Thorpe esteemed the best for cut flowers, for market.

Mr. Thorpe said that depended on what color was desired. If white, he named Jessica. The best yellow is Rohallion, blooming the tenth of October, followed by Gloriosum, about the fifteenth. It is astonishing how much difference five days make.

In reply to a question as to what variety remains longest in perfection, Mr. Thorpe said that it depends on the time of the year. The duration of bloom varies from fifteen to twenty-five days. By judicious selection and special cultivation chrysanthemums can

be had in bloom from the first of January to the last of December. Probably the blooms will not all be up to first-class grade as to form, size, color, and quality, as when flowered in the autumn, but they will possess enough good points to make them acceptable. For ten years he had never been without chrysanthemum flowers. We have to remember that they are herbaceous plants which after they start to grow keep on until they have produced buds, flowers, and — if they are natural — seeds, which completes their work. But he did not think much was gained by interfering with their natural time of flowering; as we know that strawberries are best in June, so chrysanthemums are best in November.

President Spooner spoke of the practice of awarding medals or other prizes for seedlings, upon the exhibition of their first flowers, and asked Mr. Thorpe if he thought it wise to do so, or better to postpone the awards until after a trial of two years or longer had proved the real merits of the new variety.

Mr. Thorpe replied that the first year his seedling, Mrs. Cleveland, flowered, he thought it a capital prize. It was propagated and sold the following spring, but when it flowered the second year, instead of proving itself a gem of the first water, it came down as low as third class. Yes, seedlings should always be tested more than one season, and no prize should be awarded to any until its superiority in character and habit is fully established. He said also that it is unwise for a grower to offer to the public any new plant or flower until its merits are shown to be greater than those of existing kinds, especially where varieties are so numerous and in many cases so excellent.

E. W. Wood congratulated the company present upon this opportunity to hear what Mr. Thorpe had to say upon this subject. The essayist was the man of all men in this country who could tell us most about chrysanthemums, their propagation and culture, the production of new varieties, the selection of varieties for special purposes, and all other important points. His paper gave but little of what he knows about this matter. All he knows could not be told in one lecture. We know that great progress has been made recently in the improvement of the chrysanthemum. The enthusiasm aroused in this work extends from the Atlantic to the Pacific, and in view of late successes there is no prospect of its decline in the near future. The great improvement of these plants has involved changes in the methods of their culture as great as are the changes in their character and the use made of them. To

meet new requirements of market and exhibition both the plants and flowers will, to a largely increased extent, be grown wholly under glass. But as in the past the chrysanthemum has been mostly grown in the open air, for home use in house and garden decoration, we shall like to continue that custom, and trust it will be continued. For this purpose smaller plants in larger numbers — each of which will remain in bloom from two to three weeks — will allow us great variety, improved quality, and largely increased enjoyment. In conclusion Mr. Wood asked Mr. Thorpe about the insect pest which prevents the perfect development of many chrysanthemum plants and flowers.

Mr. Thorpe said that Professor C. V. Riley, of the United States Department of Agriculture, had taken a great deal of interest in the investigation of this insect, which attacks not only chrysanthemums, but asters, golden rods, and other composites. The female stings the plant when she deposits her eggs, causing a disorganization of the sap which is shown by numerous excrescences. The best remedy he knew of is a solution of one ounce of bitter aloes in four gallons of water, with which to syringe the plants twice a week, from the first of July to the middle of August.

In answer to another question, Mr. Thorpe said that if one desires to grow plants in the open ground, to be shifted into pots for late blooming in the house, it is necessary to select such varieties as can be well grown out of doors,— those having a compact habit and bright, clean, healthy foliage that does not suffer from the attacks of either white mildew or black rust. This black rust is a Peronospora, closely allied to the potato fungus. Ada Spaulding, H. E. Widener, and Violet Rose, are kinds having many good and desirable qualities as mentioned before.

There are many of the finest, old style, incurved flowers,— which have representatives in Queen of England, Mrs. Shipman, and Princess of Wales — that do not succeed at all well here, while in England they are most popular and give great satisfaction. He had yet to see a really first class dozen of these kinds in America. They have suitable conditions over there to make perfect flowers on these varieties, which we have not here, and the difficulty must be climatic, as we have as much skill and as good appliances as the growers of any country.

In reply to the question whether there had been twenty-four Chinese incurved flowers shown in America, that would rank in

England as first class. Mr. Thorpe did not believe there had been twenty-four flowers shown here in one stand that would rank in England as second or scarcely third class. In regard to specimen plants of the old incurved kind, he said that they were not equal in quality to the cut flowers of that famous variety, Mrs. Rundle and her two sports, which always appear in competitive groups. In six varieties there are generally two out of the three Rundles, and when nine or more varieties are exhibited it is almost a certainty that all the Rundle varieties are shown among them.

A question was asked where were the best twelve Japanese varieties originated, — in Japan, America, France, or England? Mr. Thorpe replied that at this date probably the best twelve were direct importations from Japan, but added, that by next year, or the year after at the farthest, twenty-four American-raised seedlings will be in cultivation that will beat an equal number from any other country. From the fact that there are so many engaged in raising seedlings, and also because the standard of requirements has been raised so high, there are now a great many seedlings on probation. If they prove to be as good as when seen last season, they will give us these additional good varieties.

In reply to the question, what are the very best late kinds, to have in flower at Christmas, Mr. Thorpe named Mrs. Humphreys, Ethel, Mrs. H. J. Jones, and Governor of Guernsey, as ordinarily late flowering kinds; but it depends a great deal upon the manipulation of the plants. For instance, if the plants are allowed to become very dry in August, and the wood ripens, they will flower the middle of November; but if they are kept growing and the wood remains soft several weeks later, they will flower in December. The question is not so much when the cuttings are taken, as it is how continuously they are kept growing, from the time they are rooted, up to, say eight weeks before they are required to be in flower. Perhaps it would be better to take cuttings of late flowering kinds later, rather than very early.

Michael H. Norton asked for a list of names of the best half dozen varieties for market.

Mr. Thorpe said he would not attempt that. He would prefer to name one hundred — he did name fifty or more — and would leave the more select choice to his questioner, who would doubtless want them coming into the market from September 1, to January 1, consisting of all the popular colors, such as yellow, white,

pink, bronze, and red, and also a few fancy, or parti-colored varieties. Then, as has been observed, chrysanthemum flowers last about fifteen days, and as the term from the first of September to the first of January, is four months, or about one hundred and twenty days, it would take eight varieties of one color alone to cover the time. Thus it will be seen that for the five self-colors above named, at least forty kinds are required to meet the demand, and if parti-colored varieties are added, the number will be increased proportionately. Mr. Thorpe then gave the following lists — all of Japanese types — as being of great merit for market purposes during the period named. Those of French origin were:

Alcyon,	L'Incomparable,
Belle Paule,	Madame C. Audiguier,
Boule d'Or,	Margot,
Ceres,	M. Bernard,
Étoile de Lyon,	Roi des Japonais,
Jeanne Delaux,	Val d'Andorre.

Next came as many of the English varieties:

Carew Underwood,	Martha Harding,
Elaine,	Mr. Matthews,
Eynsford White,	Mrs. F. Jameson,
Fair Maid of Guernsey,	Stainstead Surprise,
James Salter,	Sunflower,
Joseph Mahood,	William Robinson.

The list of imported Japanese varieties included:

Christmas Eve,	Louis Boehmer,
Comte de Germiny,	Mr. H. Cannell,
E. G. Hill,	Mrs. Alpheus Hardy,
G. F. Moseman,	Robert Bottomley,
Kioto,	Volunteer,
Lilian B. Bird,	W. H. Lincoln.

The following American list was given:

Ada Spaulding,	Maudus,
Carrie Denny,	Minnie Wanamaker,
Cyclone,	Miss Mary Wheeler,
Excellent,	Mrs. Bowen,
G. P. Rawson,	Mrs. M. J. Thomas,
Harry E. Widener,	Violet Rose.

In reply to a question as to the possibility of producing a blue chrysanthemum, Mr. Thorpe said that a blue chrysanthemum was exhibited at Philadelphia, but unfortunately it was made of paper. However, he fully believed that we should live to see a genuine blue chrysanthemum. The old botanists declared that we could not have blue, yellow, and red in the same species of plant. But we have blue, yellow, and red hyacinths, and he saw no good reason why we should not get the same colors in the chrysanthemum. How limited were the original colors of the chrysanthemum flowers! They were a pale yellow, white, and a very weak lilac shade; and from these have been elaborated all the colors and shades we now enjoy in this flower. This has been accomplished by very slow and persistent work, in selection and cross-fertilization, and in the fixing of sports. Notice how intensified have become the yellows and how many shades there are. The lilac has become pink, of pure shading. Then as to red, Cullingfordii oftentimes, when the flowers are closely shaded, presents us with nearly a pure tone of red. The most pronounced purple we have today is a "sport" from the lightly tipped, incurved Princess of Wales. It is named Violet Tomlin and is really purple. Now we cannot get purple without blue, and to those who are hard at work in the field of development, a blue chrysanthemum would not be a very great surprise. Raisers of seedlings frequently see signs of a "new departure" four or five years before it actually takes place. The blue chrysanthemum may first be obtained from a sport.

Joseph Clark asked if the continual cross-fertilizing and high culture required to produce the large flowers now exhibited does not injure the constitution of the plants.

Mr. Thorpe said he did not believe that the constitution of the chrysanthemum had been impaired by continual cross-fertilization. On the contrary the American-raised seedlings of the past three years have decidedly more vigorous habits than those of previous years. The principal cause of this is that our raisers of seedlings have now reached a point where they will throw away all weakly seedlings, except such as show some new features which it is desirable to develop in future generations. When his seedlings are about four months old, then being generally in three inch pots, he discards all plants of puny growth and constitutional weakness, thus doing away with all the bother of nursing them, and often the temptation to keep a weakling when in flower.

Rev. A. B. Muzzey, said we were told that Mr. Thorpe had devoted many years to the cultivation of the chrysanthemum; we expected, therefore, to learn from him a great deal, and we had not been disappointed. It had been shown that he had devoted his attention and labor to one flower; had thoroughly studied its nature, its needs, and its capabilities; and in its treatment and development he has been preëminently successful. In his showing here today we see what can be done by taking such a course in any department of our work. If one would succeed in horticulture, floriculture, or pomology, let him select some one object, fix his mind on it, study it from every stand-point and master it. Let it be in the spirit this man has shown today; being fully informed, he is ready to respond to all questions, on every point of his subject. Should our members generally adopt this system, however well we have done in the past, we should in a few years become a new Society. Let us always remember that patience is genius, and persistency is success in any undertaking.

George Hollis asked, Is the degeneracy of plants inherent in them, or is it the result of the treatment they receive at the hands of the grower?

Mr. Thorpe replied that he believed all plants — just like ourselves — have a natural period of existence, provided always that they are surrounded by natural environments. The chrysanthemum is an herbaceous plant fulfilling the purpose of its being in one year's growth, and its constitution is generally not only equal to its needs, but somewhat in excess. This enables us to multiply plants by cuttings, a method which is simply an extension of the life of the parent plant, and not a complete renewal of it as in propagation by seeds. Plants not raised in America, and which are propagated here only by cuttings, must have all the weaknesses of the original stock, with a shorter prospective existence. These remarks apply to plants that are to be used as garden plants, — where no more artificial protection is given, than is provided for a geranium or other summer flowering plant. On the other hand, in the raising of American seedlings for a given purpose — as for instance, to produce a thoroughly reliable race of garden plants — we will suppose that at any time during May five hundred seedlings are planted in the open ground and are given fairly good cultivation. There will come a time when some of these plants will begin to weaken, that is, they will make no further progress, and as the trying summer lengthens many others

will drop behind, until — probably at the end of September — your five hundred seedlings have dwindled to only fifty healthy and vigorous plants. It will be these fifty then, that have the constitution and the vigor you desire to propagate. He had often said that we ought to raise American seedling plants for American gardens. A great many of the European novelties of all kinds of plants are failures here. It is not that they are worthless, but because the conditions to which they are subjected here are not to their liking.

Mr. Hollis further inquired, if the best health of stock is to be maintained, which course is best to pursue in propagation; to take cuttings from a plant which has been forced to its highest capabilities in order to produce large specimen blooms, or from another plant of the same variety which has received only such culture as will ensure merely good ordinary flowers?

Mr. Thorpe said his experience had afforded him such positive proof as to the growth of chrysanthemums, that he believes that when cuttings are taken at a fairly early time, it makes no difference whether they are cut from a strong plant or a weak one, provided always that they are properly treated afterwards. A cutting no thicker than a knitting-needle, if well cared for from the start, should be as strong at two months later date as one that was originally as large as a pencil. Some believe that permitting a plant to produce only a few flowers tends to strengthen the plant. The fact is, it costs the plant less effort to elaborate one flower than it does to perfect fifty. If a plant is allowed to carry all its flowers without disbudding, what a task it has. A single shoot of some varieties has as many as forty buds formed, and when we consider that each flower when open carries from one hundred and forty to one hundred and fifty florets, we can perceive that the strain on the plant is a very severe one.

Michael H. Norton expressed his pleasure that he had been present and heard the very able and instructive lecture, and he moved a vote of thanks to Mr. Thorpe, which was unanimously passed.

The Chairman of the Committee on Publication and Discussion announced for the next Saturday, a paper upon "Small Fruits, particularly the Strawberry," by P. M. Augur, State Pomologist, Middlefield, Conn.

BUSINESS MEETING.

SATURDAY, February 14, 1891.

An adjourned meeting of the Society was holden at eleven o'clock, the President, WILLIAM H. SPOONER, in the chair.

Joseph H. Woodford, Chairman, presented the following report:

The Committee, appointed to report recommendation of compensation for the various Committees on Exhibitions, report:

One hundred dollars to each of the six Chairmen, and one dollar each for other members whenever they attend as required by the Schedule; an account to be kept by the Chairman.

J. H. WOODFORD,
H. P. WALCOTT,
C. H. B. BRECK,
Committee.

The Report was unanimously adopted.

O. B. Hadwen, Chairman of the Committee on Publication and Discussion to which was referred the award of prizes for the best reports of awarding Committees, presented the following report:

The First Prize to Joseph H. Woodford, for the Report of the Committee on Plants and Flowers.

The Second Prize to Charles N. Brackett, for the Report of the Committee on Vegetables.

The Third Prize to E. W. Wood, for the Report of the Committee on Fruits.

The report was unanimously adopted.

The Secretary announced the receipt of a letter from the Secretary of the State Board of Agriculture, accepting the invitation to hold its winter meeting in the Society's Halls, and stating that the meeting would be held on the first, second, and third days of December next.

Adjourned to Saturday, February 21.

MEETING FOR DISCUSSION.

The Strawberry and Its Culture; Theories and Methods.

By P. M. Augur, Connecticut State Pomologist, Middlefield, Conn.

The time was when the Strawberry was regarded as a luxury for occasional use only; now it is justly considered a necessity. So much so is it, that a failure of the strawberry crop would be considered almost as deplorable as a potato famine, at least during the season when we usually have them. Formerly a few crates answered the demand in any one market; now the daily supply of our principal cities requires long, ponderous trains of cars, loaded with this most delicious early summer fruit. No apology, therefore, is needed for devoting our thoughts today to the consideration of the current theories and approved methods now practiced in the highest strawberry culture.

In noting the progress in this line, which has been made during our recollection, we see a change as great as that between the little packet ship of our boyhood days, and the great palatial ocean steamer of today. Again, when we compare a quart of selected strawberries, of the best type we knew sixty years ago, with the fine exhibition berries of the Sharpless, Belmont, and Jewell, as they appear on your exhibition tables from year to year, we are indeed amazed; and yet this is only in harmony with the rate of progress we observe in almost every department of human effort.

Therefore, standing as we now do on the threshold of the last decade of the nineteenth century, let us look forward and see where lie the opportunities for higher development and more complete success in this interesting department of horticulture.

First, then, let us consider the subject of culture as having a most important bearing on strawberry production, and being a most important factor in achieving it. If we turn to mechanics for an illustration we find that the same metal, under different methods of handling, may be made into either a stone-hammer or a watch-spring—the latter, of course, requiring a far higher degree of skill than the former, with a consequent higher value. So also a given piece of land may under a certain management yield a crop of potatoes worth one hundred dollars; the same land may under very different management yield a crop of strawberries worth ten times as much. Let it not be inferred from this that

a strawberry crop may be regarded as necessarily worth ten times as much as a good potato crop. This depends upon circumstances. The chances are, however, that under good management the strawberry at its maximum will far exceed the potato in value.

The question then comes: "What are the conditions, culture, and surroundings needed for the highest results in strawberry productions?

First, the soil. A very sandy soil is least desirable; a strong, retentive loam, well handled, the best. Taking the latter as our beau ideal, let us consider the best mode of management. We are aware that such soils have a tendency to become too heavy and compact; in a very wet season they may be soggy with water, and in extreme drought be hard and cracked. To avert the former tendency by removing surplus water, artificial draining is necessary, and at the same time it will give aëration and good mechanical condition to the soil: these are prime conditions never to be overlooked.

As the soil is the home of the plant, in order to achieve the best results all the conditions must be most favorable. The soil also being Nature's grand laboratory, we must remove all obstacles to her work, at the same time carefully supplying every requisite condition for speedy and most effective operations.

We will suppose a soil of good natural fertility but a little heavy and tenacious. We will give thorough drainage by placing underdrains thirty feet apart and three feet below the surface, to be laid on perfect grades running directly down the slope. The effect of these will be to render the soil less adhesive and more porous and friable.

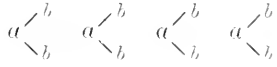
For the immediate improvement of this soil both in fertility and mechanical condition preparatory to a strawberry crop, supposing it to have been preceded by a cultivated crop, apply from twenty-five to forty cords of grain-fed horse manure, well fermented but not burned. Let this be plowed in nine inches deep, plowing across the drains, following in each furrow with a sub-soil plow running nine inches deeper, thus breaking the soil half-way down to the drains.

This operation will secure aëration from above and from below, and with the fertilizing and mechanical effect of the horse manure intermixed in the soil will furnish a most congenial home for the strawberry, and furthermore we believe that decomposition and

nitrification will go on conjointly, through the agency of micro-organisms, the whole becoming more digestible and available for superb growth and magnificent fruitage of the plants. Again, such a soil so treated is in condition to withstand extreme vicissitudes of wet and drought better than any other; easily letting off surplus water through the drains and as easily drawing moisture through its numerous capillaries from the water table beneath. The way in which lettuce growers prepare their beds is an ideal way to prepare ground for strawberries.

Having a soil prepared as described, and nicely pulverized, plant according to some definite system. Usually planters adopt the matted-row plan, setting the plants at varying distances according to the variety and the intent of the grower. We follow that plan too, to a considerable extent, because of the demand of the public for plants, having a double object,—plants and fruit. But from the stand-point of fruit production alone we should discard the matted-row system as both unphilosophical and unwise. What grower would plant corn in the matted-row to secure good ears, or beets in the matted-row to secure good roots? Cobbett, the old English gardener, said, "one or two cucumber plants in a hill are better than more, and with fifty plants in a hill you get no cucumbers." Unnecessary strawberry plants in a bed are as injurious as weeds. The maximum yield of a well developed strawberry plant may without doubt be placed as high as two quarts; I have excellent proof of this from my own experience. But this cannot be reached without space for full development.

For spring planting for fruit alone, I know of no better plan than to set in rows three feet apart and one and one-half feet in the row, allowing each spring-set plant to throw one strong runner on each side, rooting a single plant opposite the intervening space, thus: —



a, representing the spring-set plants, and *b*, the new plants from runners, so that each plant in the trio *a*, *b*, *b*, will stand at a corner of a triangle. This method of planting is particularly adapted to the Jewell.

For July planting select strong young plants and plant in rows two feet apart and one and a half feet in the row. If trying for

the greatest number of bushels I would plant a foot and a half apart each way. Just after a rain each plant can be taken up with a ball of earth adhering. Hoe frequently and keep all runners nipped off. Cover with coarse hay as soon as the ground is well frozen, removing as soon as the ground ceases to freeze in spring. Then give a shallow hoeing, and when the fruit begins to color mulch sufficiently to conserve moisture and keep the fruit clean. By the last of May such plants should touch each other both ways and yield on an average one quart per plant in June; thus showing a possible yield of 472 bushels per acre for the July planting, or 313 bushels for the previous spring planting, the young plants *b*, having higher possibilities than the older plants *a*. I do not intend to convey the idea that everyone everywhere can achieve such a result, but simply that it is possible, with all the conditions favorable, as we have ample proof to demonstrate. Fruit of the best quality is never rejected in the market.

Before leaving the matter of culture, allow me to say that in all the processes of stirring the soil, unnecessary tramping of the ground by either teams or men should be avoided. In any horticultural operation there should be convenient paths for travel exclusively, and no man or team should go elsewhere than in the paths when it can be avoided. Many men in hoeing and weeding, by frequent and unnecessary stepping actually do more harm than good. Implements for horse and man should be so constructed as to do the most work possible with a single passage or movement, and should also be as light as possible, compatible with strength and efficiency.

To go into all the minutiæ of mode or frequency of culture, I think unnecessary before an audience of experts, such as is convened here.

How shall we avoid deterioration of varieties, and keep our stock good for continuous vigor, health, and productiveness? We may justly regard this as one of the most important points connected with this subject; and how to improve our stock is a question of paramount importance.

The principles involved in developing and improving fine stock in the animal economy, hold with equal force in the vegetable kingdom. Hence, only plants having all the good points we desire to carry or to develop further, should be selected for our stock-beds, and if we see at any time a plant void of these, it should at once be pulled out and discarded.

Again, plants which have once fruited heavily should not be used for propagation, either for home beds or for market, as they have, of course, decreased vitality, and the use of such plants would ensure speedy degeneracy.

When some one point in an otherwise valuable variety is lacking, as for instance in the Jewell a disposition to throw runners freely, this characteristic may be greatly changed by marking those plants which are all right in this respect, and using only their progeny for stock plants. Some of our best fruit growers, among whom is T. T. Lyon, the respected President of the Michigan Horticultural Society, however, do not regard this trait as wholly objectionable, inasmuch as the tendency of a plant to concentrate Nature's powers on itself, rather than in profuse multiplication, lies right in the line of extreme fruitfulness. The Crescent and Haviland make runners too freely. But where slow propagation is manifestly a fault, it can be remedied by choosing plants of good vigor, struck as late as September or October, rather than heavier plants struck in July, which are crowded with fruit germs and hence have the preponderant tendency toward heavy fruitage rather than propagation. A plant that has the germs of two hundred berries is less fit for propagation than one that has fewer germs. I formerly made a mistake in sending out large plants, but I did it ignorantly. So where there is any lack in any habit of an otherwise valuable variety, it can in time be greatly modified by the judicious selection of plants for the stock-bed. To the lack of such care in the management of varieties, and to injudicious propagation, is to be charged the running out of varieties once highly esteemed. If we select weak runners indiscriminately for propagation we shall run down the character of the variety. The purchasing public are largely responsible for this, inasmuch as they will buy the most carelessly grown plants, at ruinously low rates, when at double the price they would secure carefully grown plants of high value. The same thing is true, to quite as great an extent, in regard to the propagation and sale of fruit-bearing nursery trees, which accounts for the very uneven and miserable orchards we see all about the country. We should prefer for trees the best seedlings from the best developed seeds before the feeble stocks from cider pomace, and they should be grafted at the collar, and the vicious practice of cutting up roots should be avoided.

You will excuse me if I allude to experience and observation somewhat, as I pass along.

A clergyman with decided horticultural tastes, said to me a few years since, "I raised a nice crop of beans on my land while getting it stocked with strawberry plants." You have often seen in the agricultural press, notices of similar import, how some one or other raised a fine crop of beets, spinach, peas or some other vegetable, and at the same time was stocking his ground with strawberry plants for the succeeding year. Of course I do not dispute that something of that kind can be done with a measure of success. With land of exceptional fertility it may be wise, but as a rule I doubt the wisdom of so doing. A crop of early peas may precede the setting of plants in July, provided that a new ploughing up is given, and there is no lack of fertility in the soil. We are never to forget that our strawberry crop is more than half raised the preceding year, and the question is pertinent, Which is better, a half crop of strawberries and a half crop of something else, or a full crop of berries? As an instance of high culture and its results, I will mention a case where three successive coverings of good manure were ploughed in on one acre and fourteen rods of land, and in July strawberry plants were set. When the berries were ripe many of them brought forty cents per quart, and the total receipts for the crop were $1,800. The secret of this success was that the land was full of manure and the best possible culture was given throughout.

The apostle's utterance, "This one thing I do," is a good motto for a given piece of land, for the time being.

Varieties and Their Management.— The varieties of strawberries offered to and planted by the public are numerous, and it would be beyond the limits of this paper to go much into detail in their description.

The Wilson was once every man's berry; the Crescent was called the lazy man's berry, possibly because — as was sometimes said — it would run outward and take care of itself, and perhaps there is some truth in that. The Haviland is with us much after the style of the Crescent. They are all rather too small to be satisfactory.

The Black Defiance, Hervey Davis, Gold, Henderson, and Wilder, are all claimants for high quality, but lack sufficient productiveness to be found largely in the market.

On our grounds the Middlefield, Sharpless, Bubach's No. 5, and Jewell, take the lead, the last two being specially adapted to hill-culture or the triple-row culture on rich soil.

For a soil of only moderate fertility the Crescent, Haviland, or Middlefield, would be better adapted, the others requiring richer soil and better culture. The law of adaptation has application here; you would not use a seventy-four pounder with only an ounce of powder, neither a pistol with a mammoth charge.

As a rule we have found pistillate varieties most productive when properly matched with suitable bi-sexuals, as we must have pollen for the best blooms if we wish to have perfect fruit. Thus three or four rows of the Jewell, with the Sharpless on one side and the Belmont on the other, we consider well matched. Likewise the Jersey Queen with the Cumberland on one side and the Charles Downing on the other have produced immensely. The Belmont is a valuable match for the Jewell, because it furnishes pollen even to the latest bloom.

I am strongly of the opinion that cross-fertilization for the Sharpless or any other bi-sexual variety is better than to depend on its own pollen, believing that plants, like animals, have a stronger affinity for a different strain of blood (so to speak,) from their own.

Production of New Varieties.— The fact that varieties do decline is a reason why we should make intelligent effort to produce new and better varieties. A few thoughts on this subject may not be out of place.

The mother variety from which the seed is taken should be a pistillate, chosen for its good points, with a good male parent in close proximity, in which case a true cross is well-nigh inevitable.

A more precise method of procedure in crossing varieties is the following which was a favorite plan with the venerable Seth Boyden of honored memory. Set four bi-sexual plants of a select variety in a small frame, thus: —

a		*a*
	x	
a		*a*

as at *a*, *a*, *a*, *a*, and in the center, *x*, set a well chosen plant of the desired pistillate variety for the mother plant. Let all these plants be forced to their highest development, especially the mother plant *x*. Just before the blooming season cover the frame with a sash to prevent insects from bringing foreign pollen.

Remove early from the plant *x*, all but three or four principal fruit stalks, so that the strength of its vital forces shall be concentrated in them.

As soon as the most important blooms on *x* open, remove the sash, and fertilize with pollen from *a*, *a*, *a*, *a*, using a camels' hair brush. It is better to fertilize in two or three successive operations, to ensure completeness of the work. Then replace the sash, which should be removed permanently as soon as the fruit is well set, two days after fertilization being sufficient. The finest of these cross-fertilized berries only should be used for seed. At perfect maturity mash the berries and wash out the chosen seed, place the seed on ice a few days, then sow in a box placed in a greenhouse or conservatory and when the plants attain sufficient size transplant to the open ground. These plants with good attention and culture will be large enough to stand the winter well, with suitable mulching, and will speedily be in bearing condition.

To all intelligent amateurs, to invalids, to ladies of horticultural tastes, and especially to youth of either sex, there is a fascination about this work, that is not only captivating, but also thoroughly elevating. As a recreation of absorbing interest, it is almost without a parallel. The possibility of a high degree of success, is sufficient inducement to encourage the undertaking.

The principles involved in choosing parent varieties are: first, to choose those having as many strong points as possible in common. Second, when the mother variety lacks in some one essential, select the male parent having that missing quality most fully. In short, aggregate in the prospective progeny as many strong points as are attainable. Of course we cannot sum up all the good points of both parents and *know* we have that aggregate, but possibilities lie in that direction. As already intimated specimen berries for seed should be the very largest, finest, and of ideal form and development; and yet the seeds from a single berry will produce a progeny of the widest variation, but in this variation lies the hope of improvement.

The momentum of high culture and favoring circumstances adds much to the possibilities for improvement in the new seedlings. I believe we can so combine the forces of two varieties as to get valuable results if properly handled. Circumstances of heredity will have effect; hence we cannot predict exactly what the final progeny will be. We want a Bartlett pear a month earlier than

we now have, and also a pear of fine quality ripening in March, and I think we shall obtain them; there is encouragement to make the attempt to gain them, in the fact that we need them. These are illustrations of the improvements which should be sought in raising new strawberries. Furthermore, I believe that new varieties as parents are more impressible — so to speak — than old varieties, and will engender changes more readily, and that cross-fertilization and environment will effect them more surely.

The points of importance in a new variety, are:

First, vigor, healthfulness, and large feeding capacity.

Second, a large flower, with a strong cone, whether pistillate or bi-sexual.

Third, great productiveness.

Fourth, good quality.

Fifth, good size, form, and color.

Sixth, sufficient firmness to keep well and ship well.

A variety with small leaves, and profuse in throwing runners, will usually produce small berries and stands a small chance of being retained.

A strong plant with a large, dark colored, leathery leaf throwing heavy runners, indicates a strong root-system and large fruit.

A light colored leaf is usually more tender and more subject to disease than a dark one.

All who raise strawberry seedlings will understand that the rejected plants will probably be largely in the majority. Many may properly be rejected while yet in the seed bed. Mr. Boyden said that as soon as the plant had three or four leaves he could select all that he wanted to retain for testing. The lot of seedlings comprising the Jewell numbered up to 500, but only a little more than 400 were retained to test. The more promising should be planted out in rows, staked, and numbered, so that notes can easily be taken at blooming and at fruiting from year to year if required.

Although we may have to reject ultimately 499 varieties out of 500, yet the possibility of that one choice variety will give zest to the most painstaking efforts in this direction. That the near future is to give us varieties of superior excellence, I have no doubt.

The Raspberry and the Blackberry.— With them as with the strawberry, the tendency is to over-crowding.

The land should be prepared as we have it for the strawberry; the more manure the better. Plant strong plants of the raspberry six feet by six feet; the blackberry eight feet by six feet.

When the canes reach three and one-half feet, nip off the tips; this will give strong laterals, and when those reach one and a half feet, clip them. Such plants so treated should yield an enormous crop of large berries. Few are aware of the possibilities of such plants.

Every farmer, laborer, mechanic, artisan, or professional man, may have these summer fruits in great abundance. They not only afford a rich luxury for the table, but the sanitary effect of such fruits is too important to be overlooked. We hope the time is not far distant when every household may realize the advantage of an ample home garden abounding with choice vegetables, fruits, and flowers.

We are fully aware of the abiding interest this Society takes in encouraging efforts to produce new and valuable varieties. This is in harmony with the progressive age in which we live. Progress in every other department of industry is surely made. Horticulture, Floriculture, and Pomology should in no wise be behind.

The Massachusetts Horticultural Society has a record of which it may justly feel proud, being recognized, the world over, as in the front rank of intelligent, progressive effort. We feel assured that the future of this Society will be in full accord with the past, and that the younger members, and those who shall from time to time be elected to so honored a membership, will strive faithfully to keep up the high standard so well sustained by their seniors, and by those well remembered pioneers who have gone before.

Discussion.

William D. Philbrick called attention to Mr. Augur's directions as to a closed frame of plants for hybridization, and asked how the frame was to be ventilated during the period of fertilization.

Mr. Augur replied that if the plants were protected from pollen-laden insects from the time the flowers were ready to open, and until the third day after the hand-fertilization was completed, the seed could not be affected by any other pollen. The frame could be protected from insect intruders by a gauze covering during that period, if it was necessary to lift the sash meantime for ventilation.

Rev. Calvin Terry asked for information about a prize bed of Jewell strawberries, grown by Mr. Augur.

Mr. Augur stated that one twenty-eighth of an acre of land was prepared as recommended in the essay, and planted to the Jewell strawberry, with occasional rows of Sharpless, Charles Downing, and other bi-sexual varieties to fertilize them. A committee from New York visited the grounds in June, when they requested that a record of the plat be kept for subsequent reference. The crop gathered averaged over one quart to each plant and there was not a plant missing from the entire plat at that time, a reserve bed, from which a few plants were drawn to fill vacancies, having been kept. No difference was observed in the fruit to indicate that fertilization was due to different bi-sexual varieties. The fruit measured was gathered from only the Jewell plants.

Mr. Augur spoke a word of caution against planting strawberries in grass land just broken up, as it is apt to be infested with the larvæ of the May beetle. He once ploughed up a piece of grass land and planted it with strawberries, so many of which were destroyed by the May beetle that the whole bed was ploughed up. He likes to have grass land broken up two years before planting the strawberries.

S. H. Warren asked if the lecturer thought it as important, as most writers state, that staminate varieties must be set near pistillate kinds, in order to have the latter produce perfect fruit. He said he had cultivated strawberries thirty-five years, and had picked very nearly perfect fruit from Jewell plants (pistillate) in October, where there had been no staminate variety in bloom anywhere around so far as his knowledge extended.

Mr. Augur said that no variety of strawberry produces flowers absolutely destitute of stamens. He has had a plat of Jewell plants left over, which gave many berries, but they were imperfect; also, some years the Crescent has yielded quite a crop alone. But we must not presume to depend upon self-pollenizing in pistillate varieties. He desired to add a word on the utility of bees and other insects in pollenizing the flowers of strawberries and other fruits. He stated that by a wise provision of Nature, at the time the pollen-grains ripen, a saccharine substance exudes within the flower and attracts the insects which, while busily gathering sweets, are unconsciously made the agents for the more complete pollenization of the pistils which otherwise might remain undeveloped.

Mr. Warren had found that the Jewell requires more water than any other variety, and that when grown on land moister than the average garden soil it throws out plenty of runners. He asked the lecturer if he took but one crop of fruit from one setting of plants.

Mr. Augur replied that time is money, and he was very decided that it requires too much time and labor to weed an old bed; besides, the second crop is always much inferior to the first. Therefore, it does not pay. He preferred to alternate with other crops.

Mr. Warren asked whether planting in hills is preferable to planting in beds.

Mr. Augur thought he had better success as respects the fruit when he planted in hills than in matted beds. In the first case he got more and better fruit; in the second he got some fruit, but many more new plants, for which he has always a large demand.

E. W. Wood remarked that we have had this lecture to teach us about the varieties of the strawberry, and the theories and best methods of practice in its propagation and culture. The essayist had given us so much to think about, that others see no necessity for talking. He is one who has done more than any other person to develop this fruit, and show its capabilities. We notice that most varieties do not long continue to be generally grown. Many that were very popular not long ago are not now seen on our exhibition tables; in fact during the last ten years almost every old variety has disappeared. The speaker did not know where to go now to find any plants of La Constante, Wilder, or Hervey Davis, although some were shown here less than two years ago. Taking the experience of the past as a guide, it would appear that we must depend upon new seedlings for renewal of our plants. How many will carefully carry out the methods Mr. Augur has described to us today? We want an earlier kind than May King if possible, and larger also. The new strawberry producers have been concentrating their efforts on the increase of size regardless of quality. The market demands the largest and best looking fruit; consequently this is sold at the highest price, while medium and smaller varieties have to be sold at about half price, although they are of a far better quality and more productive. While they are not profitable for the market, they are preferable for the home garden, as they produce enough for the amateur.

Mr. Augur's mode of growing plants for fruit is correct for him, but few large growers would cultivate them in that form. The Sharpless or Belmont would give enough work to keep off their numerous runners. The Belmont is quite productive of fruit even when grown pretty thick. The only objection to the Jewell is that it does not produce runners freely; but it is the most prolific in fruit, and it is best grown in beds. We have thought the growers at Belmont, manured pretty freely when using twenty-five cords to the acre for three crops, but the speaker took a long breath when the lecturer told of using forty cords to the acre. He spoke of an Arlington market-gardener having 24,000 feet of land, on which he set strawberry plants in rows five feet apart and eighteen inches apart in the row. Egyptian beets were then set fourteen inches apart as an extra crop and the gardener claimed that he got as many strawberries as if no beets had been growing there. The next year his crop of strawberries brought $800, and he also received $86 in prizes. The speaker thought the matted row system of planting strawberries the best.

Mr. Warren inquired if the plants wintered as well in hills, or in beds where the runners have been cut off, as they did in matted rows. His own opinion was that the plants in the first two cases were more likely to be thrown out of the ground by frost, but in the matted beds they were not so much exposed.

Mr. Augur answered that he likes to cover the plants pretty well during the winter, and uses from two to three tons of coarse hay per acre for that purpose. The plants do not suffer at all when thus protected, while plants exposed are more or less injured by alternate freezing and thawing. He stated further that he accepted Mr. Wood's idea of matted rows, provided they are not allowed to become too much matted. With any variety he would set the plants three feet apart, which would allow sufficient room for all needed new plants. This seems to call for a great deal of work, in preparing the ground, but that is done rapidly.

O. B. Hadwen said that he had been very much interested in all he had heard at this meeting. Mr. Augur has shown us how he cultivates strawberries, and what the best culture produces. Mr. Wood has told us of the liberal use of manure, from twenty-five to forty cords per acre, and that the latter figure seems an extraordinary amount. He could tell of an experience far exceeding that. A gentleman in Connecticut, who is able to do as he

pleases, told him that he used one hundred cords of manure per acre, for strawberries, and in addition had applied liquid dressing which was obtained by leaching a quantity of other manure. The effect of such treatment was astonishing. Plants set in August had made such a growth by the end of September, that a half bushel measure could not be put over one of them. Similar treatment was applied to melons and other crops with equally surprising results. Mr. Hadwen also spoke of the longevity of varieties of the strawberry, saying that with the exception of our native and the Alpine strawberry, all those he knew in his boyhood are now lost to sight. Perhaps Hovey's Seedling had the longest life of any cultivated variety—about forty years. The type of this berry changed in form both of leaf and fruit, even in Mr. Hovey's own grounds. In 1840 the price of Hovey's Seedling plants was twenty-five cents each. The Wilson held out only thirty years, and most others have had but a short career. The essayist had a great opportunity and knowing very well how to improve it, had accomplished a valuable service to all growers of this fruit. The speaker was convinced that we must depend on new seedlings for future use.

Hon. Aaron Low being called upon said that many of the lecturer's points agreed with his own experience. He bought Belmont plants and set them on clay ground, and planted Jewells alongside to grow runners. The Belmont made many runners and the bed was the handsomest of that variety he ever saw, but many of the berries were imperfect. The Jewell plants were a great success, but he thought a cross produced from Jewell and Belmont would be very desirable. He believed Mr. Augur's theories about cross-fertilization for new varieties are correct, but that a great deal of experience is needed before one can expect much success in such operations. He was convinced that after a flower has been fertilized by hand, bees cannot affect it very much. In regard to producing new varieties of potatoes, he believed it could be done only by planting the natural seed balls, as that is the way Nature multiplies varieties in vegetables. The tuber of a potato is *not* the seed, although the variety can be propagated by the eyes of the tuber as it can by cuttings of the green stalk, as many other kinds of plants can be multiplied. New varieties must be produced by cross-fertilization of the flowers, and planting the seed produced from those flowers. As there will be great

variation in the general characteristics of the seedlings thus obtained, the operator should select such as show the greatest development of the essential points desired in the new varieties to be brought out. From these, by careful selection and training for a few years, the much desired new variety, superior to all others will be established, and by continually using the best specimens as seed-stock, it can be maintained pure, avoiding the natural tendency to go back to the form of one or the other parent. In producing new varieties of corn there is but little trouble, the fertilizing pollen is so readily carried by the wind and falls upon the silk of different varieties. Thus crosses are being made continually from the kinds planted near each other. But to permanently establish any desired point in quality or character requires years of careful experiment, training and watchfulness, as all such crosses have a natural tendency to "sport," and if not grown at a long distance from all other varieties, they are liable to accidental cross-fertilization.

Mr. Augur desired to state in regard to heavily manuring land, that he had never put forty cords of such manure as he recommended upon one acre, but it was only because he could not get it.

Mr. Warren stated that he had invented a machine for cutting off strawberry runners. It consists of an iron finger which passes under the runners, and a circular knife — worked by the wheel on which the machine is carried — which cuts off the runners as fast as they are gathered up by the finger and as fast as a man would walk. It is to be used after the runners have generally struck roots, but he had not used it very much of late as he thought the plants did not winter as well if so cut just before the colder season came on.

On motion of Mr. Hadwen, a vote of thanks to the essayist for his interesting and instructive paper, was unanimously passed.

The announcement for the next Saturday was a lecture upon "The Geographical Distribution of Plants," by W. F. Ganong, Instructor in Botany, Harvard University, Cambridge.

BUSINESS MEETING.

Saturday, February 21, 1891.

An adjourned meeting of the Society was holden at eleven o'clock, the President, William H. Spooner, in the chair.

The following report was presented and accepted:

The various Committees have voted to postpone the Exhibition of March 25, 26, and 27, to March 31, and April 1, 2, and 3, as the first-named dates occur in the week preceding Easter, when plants and flowers will be scarce.

Patrick Norton,
E. W. Wood,
F. L. Harris,
C. N. Brackett,
Arthur H. Fewkes,
John G. Barker.

Horticultural Hall, Boston.
February 14, 1891.

Adjourned to Saturday, February 28.

MEETING FOR DISCUSSION.

The Geographical Distribution of Plants.

By W. F. Ganong, Instructor in Botany, Harvard University, Cambridge.

The subject I am to present to you this morning, as you may perceive from its title, is not horticultural. A Botanist trained in the methods of scientific Botany today, does not necessarily know much, or anything, of those practical details so essential to the successful pursuit of the most delightful of avocations—that which is the province and pleasure of the members of this Society. Yet Horticulture ought to be, and is, a broadening study, and I am sure that a short excursion into fields of more abstract science will have more than a passing interest for you.

Certainly the field to which I invite you is broad enough and scientific enough, being no less in extent than the earth's whole surface, and the laws which govern the position upon it of every

living plant. I fear, should we attempt to cover in detail so great a territory that we should not have ranged very far before all of my allotted time and your patience would be exhausted; and we shall therefore do well to concentrate our energies upon the characteristics of its salient points.

It is undoubtedly the case, that the point of view from which the Horticulturist regards the Plant, is very different from that of the professional Botanist. For the former, the plant has its highest interest in its adaptability, actual and possible, to the necessities and enjoyments, both bodily and mental, of mankind; and its susceptibility to indefinite improvement along these lines is one of its greatest charms. But to the scientific or philosophical naturalist, the plant is more of an abstraction. It chiefly interests him for what it represents of natural laws and phenomena. He regards it as a being, filling a most important place in nature by virtue of its very perfect adaptability to the conditions of that place, and each of its parts exists for a similar reason. The root is an organ for the absorption of liquids from the soil, the leaf for the manufacture of organic from inorganic materials, and the stem to bring these two into proper relationships with each other and with their surroundings. The flower is but a highly-perfected device for securing the co-operation of two parents in the production of offspring; the fruit is the agency by which is secured the necessary ripening and wide scattering of the seed, and the seed itself is but a specialization of the plant structure for holding the life of the species for a time in suspension, so to speak, to enable it to continue existence over certain unfavorable periods. And these organs have their immense variety of forms simply to fit them better to perform these functions, under the different conditions to which they are subjected. That they are useful to man, or that they have beauty to delight us, is, from this point of view, but incidental; and is either but the happy coincidence of our own needs and tastes with what is best for the plant, or else the result of the gradual adaptation in times past of our own needs and tastes to what there is in nature best adapted to supply or gratify them. The plant is the creation of its ancestry and its surroundings, and represents the resultant of innumerable influences acting upon it from these two sources. The plant, indeed, from the scientific point of view, represents the meeting point, or focus of an infinite number of forces or influences acting upon it from varying directions and with varying intensity,

and this focus or resultant is to the forces very much what its centre of gravity is to a complexly irregular body. It represents a most delicately adjusted balance of conditions—a state of unstable equilibrium, which may be altered by the slightest change in any one of the forces; and the plant must become something different just in proportion to the intensity of the change. These influences are none the less real because so minute, and their study is the study of plant life. To complete our conception of this kind of study, it must be added that the scientific botanist believes, in his working hours at least, in the uniform immutability of those series of concatenations of events which we call the laws of Nature; and moreover, leaving the unknowable for the use of the metaphysician, he acts upon the belief that all things in nature *are* knowable, can we but sufficiently refine our methods of investigation.

Now the point of these observations lies in the application thereof to our present subject. Each and every plant has its place on the earth's face fixed by a tremendously complex set of influences, some strong, some weak; some acting through heredity, some from environment; some from this, some from that; the end and result of all of them being to make the plant just what it is, and to place it just where it is; and any change in any of these influences will disturb the balance, move the focus, and cause a corresponding change in the plant, which will vary directly as the influence. And in this brief survey of the field we can but consider the broader pencils or groups of forces determining the geographical distribution of plants, taking time to resolve none of them into lesser groups, much less into smaller details.

The great controlling or limiting physical agencies in distribution then are these:

I. Heat and moisture, or in other words, climate.

II. The past geological history of places.

And this is true not only of great areas, but as well of the most limited, and there is not a square mile of land in New England which will not furnish illustrations of this principle. The main cause which confines the Cactus to the desert and the great Aroids to the damp forests, is the same, but in lesser degree, which places on our dryest knolls our Saxifrage and Everlasting, and in our marshy pools our Iris and Calla. It is but the same cause in different degree which allows the low Arctic herbs to exist upon the Himalaya, and the white Potentilla upon our own most exposed and coldest

shores. And the extremes of these conditions are represented on the one hand by the frigid barrenness of the Arctic zone, and on the other by the rank luxuriance of the Middle Tropics, and there is every gradation between. It is true that other influences are at work also,—prevailing character of the soil, abundance and kind of enemies, etc., but heat and moisture are undoubtedly the most important of all those which belong to the physical surroundings.

Now the distribution of heat over the earth's surface is determined by several conditions, amongst which the most important are these:

(1) Other things being equal, the greatest quantity of heat is received from the sun by the earth at the equator, and the amount diminishes regularly towards the poles, the whole being subject to regular variations owing to the movement of the earth placing the the sun alternately north and south of the equator. It is plain that, were it not for the disturbing effects to be mentioned below, the earth would be divided into great latitudinal zones of temperature of uniform breadth, to which vegetation would tend to correspond, and our problem from this point of view would be greatly simplified.

But (2) the relative distribution of land and water powerfully affects these zones. This includes the influence of cold and warm currents, whose effects are marked enough. Everybody knows how the Gulf Stream raises the mean annual temperature of Northwestern Europe, or how the great Japanese current raises that of British Columbia and Alaska. And on the contrary we are very sensible ourselves of the way in which the cold Labrador current keeps our mean annual temperature reduced below that to which our latitude entitles us. Again the principle that great masses of water are equalizers of temperature, and that great masses of land permit of extremes, is one of much importance; and abundant illustration will occur to all in the case of the extreme range of temperature to which the cities of the central states are subjected as compared with the much smaller range of the mercury in the seaport towns.* And its importance becomes still more manifest when we compare the well-known evenness of the temperature range of oceanic islands, with the conditions prevailing at Yakutsk in Siberia, which lies well within the greatest body of land in the world

*The climate of Boston does not afford a fair illustration. It is so near the Cape Cod Peninsula, which is the great natural boundary between the colder northern and warmer southern waters, that it is exposed to a set of very unusual conditions.

and which has the greatest extremes of temperature of any place in which observations of this kind have been made.

(3) The height of land above the sea-level always causes, *ceteris paribus*, a direct variation in temperature, this falling as the height increases, and of course rising as the height diminishes. From this cause it happens that we find upon high mountains, a series of stages in the vegetation, the characters of which indicate successively colder and colder zones. And usually, as all botanists know, the vegetation of these successive zones of altitude corresponds closely to the vegetation of those places farther north, which at or near the sea level have the same mean of temperature; in other words we have zones of altitude corresponding very exactly to zones of latitude, and wherever the late geological history of a region has permitted of it, the vegetation of these two kinds of zones corresponds not only in general characteristics, but is composed of identically the same genera and species. Hence it is that we find arctic plants upon the Alps and Rockies, sub-alpine plants upon the White mountains, and Antarctic plants upon the Andes — a subject soon to be referred to again.

The influence of the first of these conditions, must be prodigiously altered by the second and third, and the effect will be to make the zones of temperature extremely irregular. Humboldt invented a very simple method of graphically representing the boundary lines of these zones; that of drawing upon a map isotherms or isothermal lines; and any map upon which these are drawn will show very clearly the effect of the second and third of the conditions mentioned upon the first. And it is important to notice that all of these conditions operate as well upon a small as upon a large scale, though in diminished degree, and therefore distinguishable with more difficulty.

It is necessary to note, in connection with this subject of temperature, that the whole matter is complicated somewhat by the fact that the distribution of plants depends quite as much upon the average temperature of the growing and reproducing months as upon the average annual temperature—perhaps, indeed, a good deal more. This serves to explain those cases in which grains will thrive in regions very far north of where, from their mean annual temperature, we should expect; this seems to occur wherever the actual average temperature of the actual growing time is high, even though that of the remainder of the year is disproportionately low, as

happens in parts of northwestern Europe and of the Canadian northwest.

The distribution of moisture depends of course chiefly upon rainfall, which in turn depends upon meteorological conditions of which the discussion is not in place here. It is enough for our present purpose to note that in general the tropics have the greatest rainfall and that there it is extremely regular. All readers of Mr. Wallace's remarkable book, "Tropical Nature," will remember his most graphic account of tropical rains and their effect upon tropical vegetation. With an abundance of evenly distributed solar heat and an abundance of evenly distributed moisture, it is no wonder that tropical forests are so luxuriant. Just outside of the tropics comes a great rainless belt which includes nearly all of the desert regions of the earth, and beyond this again, both north and south of the equator, we come to the regions of variable rainfall, with which purely local conditions have so much to do, and passing which we come to true Arctic conditions. Amongst the important local causes influencing rainfall in the temperate regions are the proximity of the sea, direction of the prevailing winds, and the presence or absence of mountain ranges. The latter always tend to cause precipitation on themselves, and between themselves and the sea, and to shut off from the blessings of the rain the region on the side away from the sea. It is, for instance, owing to the presence of the Sierra Nevada and Cascade ranges that the region to the west has so much more abundant a rainfall than has the region on the east of them. Upon this side of the continent, the Alleghanies are not high enough to produce more than a partial effect in this direction.

And secondly among the controlling agencies in distribution comes the geological history of plants: geological history in this connection means simply the story of the changes in the distribution of land and water in past times as compared with the present—and the consequent migrations plants have been forced to make, not always into regions the most favorable to them. Hence it has come to pass that plants today are not all placed on the earth's surface just where the conditions are most favorable to them, and many of them when introduced into new lands, often find there conditions more congenial than in their old homes. But geological history is of more importance as a distributing agency, and we shall in a few moments consider it in that connection.

Now these two, I must ask you to notice again, are the limiting

or controlling agencies; they are not the distributing agencies. And they are the controlling agencies for this reason: every species of plant, without exception, has certain definite maximum and minimum points both of temperature and moisture within the range of which it can live, outside of which it must perish; and moreover each has within those limits a certain optimum point of temperature and optimum quantity of moisture at which it flourishes best, and each plant, other things being equal, could flourish anywhere on the earth's surface where these best conditions are realized, were the field open for it and *could it but get there*. But that is the great if; plants have comparatively very small powers of travelling themselves, and geological history, with its forced migrations, has driven them into the regions where we find them and kept them out of others to which they are equally well fitted. You can understand better now what I meant at the beginning when I said that a plant is the creation of its history and its surroundings, and that these have operated to make it just what it is and to place it just where it is. And I trust you will understand it still better before I shall have finished this lecture.

These being the limiting agencies, we are now prepared to look at the distributing agencies and to note what effects have been produced on vegetation by their combined action. These distributing agencies are three:—

I. Natural methods of dissemination.

II. Influence of man, direct and indirect.

III. Geological changes — the changes which have in past times compelled groups of plants to migrate from place to place.

The first and second of these deal chiefly with single species, and are therefore of less significance. The third has to do with great masses of species historically connected, or Floræ.

The subject of the natural dissemination or scattering of seeds is one of the most interesting topics in botany, and I am sure a presentation of it would prove of great interest to you.

Plants have developed the most remarkable devises to secure a wide scattering for their seeds. But their bearing upon our present subject is limited by the fact that these devices are rarely adapted to carry the species beyond a limited distance, and very rarely indeed are they of a character to enable the plant to surmount the natural barriers imposed by mountain ranges or wide seas. Of the exceptions one of the most important is found in the cocoanut. This fruit has a thick but very light coating, which is unusually

resistant to the action of salt water. The palm which bears it frequents the sea margin, and the fruits falling into the water are carried immense distances by the action of winds and currents. Hence the coco palm is one of the first plants to appear upon coral islands, and it has even been said to be the only palm tree common to both hemispheres. Again, there are certain species of which the seeds or fruits have developed plumes or tufts of fine hairs which make the total bulk of the seed or fruit very large in proportion to its weight, thus enabling the wind to carry it very long distances. Such is the case with many Compositæ, as for instance the dandelion, the plumose fruit of which is known to everybody. This can be carried by the wind for hundreds of miles, and hence is widely scattered over North America and Europe, and very probably much beyond these limits. And many other instances of a like character could be cited. A most interesting and important branch of this inquiry is concerned with the natural return of plants to localities from which climatic changes have driven them. Thus the glacial ice-sheet drove all plants before it to the South, but when it in turn retreated back to its home in the frozen North, these plants tended to follow it and re-occupy their old haunts. Now there is every reason to believe that those plants having methods of rapid dissemination and therefore an advantage over their less fortunate relatives, travelled more quickly and occupied the ground, and that the slower moving forms are still with difficulty making their way back whence they came. This seems to be well illustrated by the trees. The forms which have light-winged seeds easily scattered by the wind, such as birches and willows, extend very far north, and the same is true in lesser degree of the elms and maples. But the heavy seeded trees like beeches, oaks, chestnuts, etc., are not so far advanced as their constitutions will allow, and they are slowly but steadily moving north, a point which is well argued by Professor Shaler of Cambridge. And the extremely different rate of the natural spread in this way of the various species, when a new land connection is formed with another district, must be taken into account in all these studies.

Another method of securing dissemination, of wide prevalence and effectiveness, is found in those fruits which by bright colors are made conspicuous, and by juicy pulp palatable to birds or animals—a very large class, including nearly all of our edible fruits. In such cases the seeds are swallowed with the fruit and being provided

usually with indigestible coatings are carried long distances, ofttimes, before they are left by their carriers. The widest distribution by this agency is undoubtedly secured through the birds, for birds can cover a much greater area within a limited time after a meal than can animals, and moreover they can pass readily over those natural barriers — hill ranges and smaller arms of the sea — which animals cannot. But we must not over-estimate the importance of this agency, for birds of the longest flight are generally carnivorous, and can only occasionally and accidentally get some seeds into their crops when other birds are their prey. Still a wide dissemination of certain species is secured in this way, and some of our edible berries are good examples. Those seeds which cling to the hair or wool of animals also secure some scattering in this way, but it is limited, as mammals do not as a rule range as far as birds. There is one peculiar case, however, in which a certain very modest species is believed to be the most widely distributed in the world (for modesty is no bar to success in the vegetable kingdom), and this has been brought about by the agency of birds. That is the case of our very common water-shield, *Brasenia peltata*, which is scattered widely not only in North America, but is found also in ponds in Asia, Africa, and Australia. As the species has not an edible fruit, it is supposed that the very sticky fruits cling to the feet of aquatic birds and are hence carried over greater distances than would be possible in the case of edible fruits of the ordinary kinds. In all of these cases of course the distribution is ultimately limited by the purely physical conditions of which we have spoken, and the competition from the forms already occupying the ground to which the new seed is carried.

The next great influence that we must consider is that of man. Man is always prone to over-estimate his own importance, and this applies with particular emphasis to his relation to the remainder of Organic Nature. His influence upon the Plant Kingdom has been far less than appears at first sight, and almost uniformly unfavorable, and it is a fact that the remainder of the world would get along better if he were to drop out of it altogether. We have to a slight extent altered nature; I doubt if we have improved it.

The direct influence of man in carrying plants from place to place will occur to you first. But this includes for the most part forms cultivated for food or for ornament, and the majority of them, if left to themselves in their new homes would soon be

exterminated, and hence produce no lasting effect upon plant distribution. Such is the case with grains and most European garden flowers introduced into this country, which rapidly die out as soon as cultivation ceases. Cultivation largely consists in keeping away from a plant its natural enemies; and most plants when carried to a new home cannot, unaided, compete with the native forms, whose constitutions have been acclimatized by centuries of residence. Hence the transfer from place to place by man, however extensive it may be, of plants which could not exist in the new region without his constant care, has but little to do with our present subject. But there are some plants which he transfers, generally unintentionally, which often find in their new homes conditions favorable to their rapid growth and spread; and they frequently make themselves at home to such an extent that they become great nuisances. Such are most of our weeds. As is well known, nearly every troublesome weed in our own regions, for instance, has been introduced either from Europe or from the open lands of the West. The reason for this appears to lie in the direction pointed out by our greatest botanical philosopher, the late Asa Gray. The native weeds are all forms which have developed in or with the woods, and when the latter were removed in the processes of cultivation, they found conditions to which they were unaccustomed and for which their constitutions were but poorly fitted. The European accidentally introduced forms, however, after their centuries of struggle with European civilization, hardy and self-reliant as our own street urchins, found here a field not only just such as they were adapted to, but occupied by no forms which could offer them vigorous competition. Hence, they multiplied and occupied the earth. In a lesser degree the conditions were favorable to plants from the west accustomed to open ground. It is along these lines that man has produced his greatest effects upon plant distribution. You notice that we are considering now the question from the Naturalist's stand-point, not from the Horticulturist's. To the latter the transfer of Cinchona from South America to India, of Eucalyptus from Australia to California, of the Maize to Europe and China, is a large matter in comparison with his accidental transfer of a few troublesome or ugly weeds from the old world to the new; but to the naturalist the question of the weeds is of as much if not more interest and importance,—certainly it is to the organic world which the naturalist ought honestly to study.

In fact, the cases in which man has produced any considerable effect upon the vegetation or flora of a region are extremely few, and the effect is nearly always destructive. He often clears away an entire forest leaving in its place hideous, naked barrenness, but where has he made a wilderness to blossom as the rose,—with wild plants which could sustain themselves after his watchful care is removed? The Island of St. Helena is a case in point, in which by the combined action of the axe and of introduced browsing animals, principally goats, a rich vegetation, peculiar to that island, has been nearly exterminated from off the face of the earth.

And now we approach that part of our subject which I am sure will prove the most interesting to you,—the distribution of the great floras of the earth. A flora is simply a great group of plants which have had a common history. There is no fact better established in geology than that the earth's crust is not stable but is constantly undergoing extensive elevations and subsidences; this brings it to pass that land and water surfaces are not constant but changing, and that many regions now separated by the sea have in former times been connected, and many now connected have but lately become so. These changes have forced vegetation to perform migrations which have been small or extensive, slow or rapid, just in proportion to the change, and these have been accompanied by great changes in climate, including even such extreme conditions as prevailed in the glacial period.

In looking at the Distribution of Plants in a broad way, the first feature to strike attention is the constancy with which upon higher mountains we find plants characteristic of regions far to the north of them in the northern hemisphere, and far to the south of them in the southern—and in all cases cut off from their brethren by many valleys and plains occupied by totally distinct species. Thus, upon the Rocky Mountains, the Alps, the Himalayas, and others, are little herbaceous plants which are found growing at the sea level around the Arctic ocean. Farther down these mountains come plants which grow in more southern parts of Alaska, Labrador, northern Scandinavia, and Siberia. Now it is plain why they can live there—the conditions of heat and moisture upon the mountain side and at the sea level farther north, are similar, as we have seen; but how did the plants get upon the mountains from the North? The natural means of spread of

the species themselves is hardly ever sufficient to explain this. But the solution is undoubtedly found in late geological history. In the glacial period, geologically very late, as you know, there descended from the north a great ice sheet of enormous thickness, which drove all vegetation before it. It came so far down that Arctic plants were driven to the south of the region in which we are now living and arctic plants flourished all across the United States just south of a line from about 40° north latitude on the Atlantic coast, running diagonally north-westward, and in corresponding regions in the eastern hemisphere. Along the high mountain ranges these plants extended much farther south, finding upon them their natural conditions of heat and moisture. Then the ice-sheet retreated; the arctic plants followed it, and they in turn were followed by the north temperate,—they by the warm temperate, and so on, each tending to return to its own latitudes. But along the high mountains the conditions did not change much, and the arctic plants found upon them, as they find today, congenial homes, where the species of the lowlands could not compete with them. In the valleys, however, the more southern species were more at home and soon drove out the arctic intruders. So wide-spread and definite was this agency that there has not been a mountain range explored in the northern hemisphere upon which traces of these arctic plants have not been found; moreover, the lower ranges, those, like our own White Mountains, not high enough to reach the line of perpetual snow, have not the extreme arctic forms upon their tops, but sub-arctic or very cold temperate forms, and these extend south along the hill ranges, ascending as they go. A very interesting point in connection with this is the fact that in the glacial period some of the arctic and sub-arctic forms managed to cross the equator along the highest mountain chains of the old and new world and establish themselves in the southern hemisphere, and are there found on the mountains at the present day. Hence we have a great natural group of plants called the *Arctic-alpine Flora*, consisting chiefly of low herbs, the distribution of which is all around the northern part of the northern hemisphere upon the shores of the Arctic ocean, and southward upon nearly all mountains high enough to reach the limit of perpetual snow, and even extending sparingly on the great ranges into the southern hemisphere, at length reaching the sea level near the Antarctic ocean.

Secondly, in the Southern hemisphere, we have a very similar, though much less abundant *Antarctic-alpine Flora*, which is found near the sea level on the islands of the southern ocean, and extends northward upon the mountains of Chili, Australia, Tasmania, and New Zealand, and even up to Borneo. The phenomena of distribution of this Flora are so similar to what is found in the Northern hemisphere that it is believed its distribution can be best explained by a southern glacial period.

Proceeding next to Temperate regions, we find a most marked contrast between the northern and southern hemispheres. In the former we find the plants, the ordinary trees, shrubs, and herbs which we all know, all across Europe, Asia, and America, are much alike in character, and the differences between the plants of different regions is rather one of relative richness or poverty in forms than of differences in the forms themselves,—a point which I will refer to again immediately. Hence, with the exception of a specially rich assemblage in the Caucasian and Western Mediteranean region, all the plants of the northern temperate zone are grouped into one Flora called the *Intermediate* or *Temperate Flora*, and the rich exception of which I speak is appropriately called the *Mediterraneo Caucasian Flora*. This latter is exceedingly rich in species, six-sevenths of those of Europe belonging to it. Now the uniformity of this Northern Temperate Flora is very fully explained by what is known of its history. Around the Arctic ocean, at several points, in Greenland, Spitzbergen, Siberia, and other places, there are found abundant fossil deposits of plants in Tertiary rocks, which fossils are undoubtedly the remains of the ancestors of our living north temperate vegetation. Not only are the species of fossil and living forms very similar, but in many cases they appear to be identical. Our North Temperate Flora then, in the Tertiary Period, lived and flourished all around the Arctic circle and within it, and probably extended to the pole itself. Then great climatic changes drove it southward, and it peopled all Europe, Asia, and America with a similar flora. This was subsequently driven to the south by the Glacial period, as we have noticed, and in the changes attendant upon that process and its return northward, parts of it suffered severely. Thus, in Europe, this flora is for the most part a poor one, having far fewer species than our own. This is explained doubtless by the fact that in Europe the mountain ranges run east and west,

and as the glacial sheet advanced southward, the plants of central Europe were caught between it and the increasing local glaciers from the Pyrenees, Alps, Apennines, and Caucasus; there being little chance for escape many of the forms were exterminated, particularly those not having natural means of wide dissemination. And many of those which escaped the icy jaws of the glaciers were pushed across the Mediterranean. This they were unable to recross when the glacial ice-sheet retreated, and but few of the exiled forms could return to their homes again. That this was the true course of events is rendered nearly certain by the fact that these missing forms are found fossil in late deposits in central Europe, showing that they existed there anterior to the Glacial epoch. Central Asia has to some extent suffered in a similar way, and Greenland has its flora swept off into the deep sea, and it has not now the plants to which the climate of its southern part entitles it. But the conditions were very different in eastern America, and in eastern Asia. Here the mountain ranges run north and south, or nearly so, and in Asia the great ranges end before they reach the sea. Thus a free passage was open along which the plants travelled south out of harm's way, and north again when the enemy had retreated. Hence the floras of eastern America and eastern Asia are both exceedingly rich in species and most strikingly alike, each having preserved nearly all of its species through the vicissitudes of glacial times.

But why is not the flora of western America rich and like that of eastern America? This question is not so easy to answer. It is true the Rockies run north and south; why were not all the western plants preserved? Several causes have doubtless contributed to destroy them, one of which is the extreme narrowness of the region west of the great mountains, and, hence, the crowding and extermination of some species, and another the fact that the very uniform climate of California is not so favorable to the northern species, accustomed to more variable conditions, as it is to the more southern forms of Mexico; and these latter have travelled in large numbers into California and possibly by direct competition have exterminated some species. Certain other geological conditions have doubtless contributed somewhat to the same end. But the fact remains that like that of Europe, the flora of the Californian region is poor in temperate species, while those of eastern America and Japan are rich and much alike.

In the southern hemisphere, we find a very different state of things. There the great continents, separate from each other from a most remote period, possess floras strikingly distinct from each other, so that it is necessary to assign to each great body of land its own distinct Flora. This gives us

The *Australian Flora*, showing some slight traces of connection with the region to the north of it and with New Zealand. Australia has been so long separated from the other bodies of land, that its flora has had time for a great deviation from that of other countries. Indeed it is notorious for its unlikeness to that of any other country.

Next the *Andean Flora*, that of South America, which shows some very slight connection with that of New Zealand and Australia.

Then the *Mexico-Californian*, which extends up the west coast of America from Chili to Mexico and even into California, being the source of many of our present Californian species.

Lastly the *South African* is very rich in species and remarkably varied. And just as our North Temperate plants have representatives far south of them on the mountains, so these Southern Floras have some of their members on mountains away to the North. "The plants of Fuegia extend northward along the Andes, ascending as they advance. Australian genera reappear in Borneo and even cross to China and Japan. New Zealand forms are on the mountains of New Caledonia; South African in the Lake Region of Africa, in North Africa, and even to the Canaries and Asia Minor." And in all these cases, the southern, like the northern, forms ascend the mountains as they approach the equator, and descend toward the sea level after they have crossed it.

Now what is the history of these widely separated regions? There seems every probability that in times far back all these floras came, not from the south but from the north; and the time when they had a common home there is so remote that the floras have had time to diverge greatly. That this is the correct view is sustained by the fact that these southern floras are much more like those immediately to the north of them than they are like one another; that there is no evidence of a southern continent from which they could have come; that while most peculiar species of the South have relatives either living or fossil in the North none of the northern forms have fossil relations in the South.

Lastly come the tropical floras, characterized by great abundance of all kinds of vegetation and with a preponderance of succulent moisture-loving plants. Of these there are three, markedly distinct, if we consider the relationships of the plants of which they are composed; very similar if we consider their general appearance. They are

The *American*, reaching its highest development in the Valley of the Amazon. It is excessively rich in species and luxuriant in growth. Secondly comes

The *African*, still imperfectly known but also very rich. Many of its general physical characteristics have been vividly sketched for us in Mr. Stanley's latest work. And third is

The *Indo-Malayan*, including India and all the East Indian Archipelago with the Malay Peninsula, and extending even to Australia and Japan.

The relationships of these three are sufficiently well-known to indicate that while they differ much from each other, they are more alike than are the floras of the South Temperate Zone which we have considered,—a fact tending to show that the former may have been connected with each other more recently than the latter. From this the step is but a short one to the theory some years ago propounded by an English naturalist, that all the floras and, therefore, all the plants of the earth have originated in the northern hemisphere, and that they have spread southward in successive great waves, the more southern and older floras being the most ancient of these, and the more northern floras later in time.

And in conclusion, to sum up the whole matter, I hope I have shown you that while the causes controlling the Distribution of Plants are many and rendered exceedingly complex by their interaction, we can separate out the principal agencies and trace their effects; that the agencies limiting distribution are the needs of plants with reference to the amounts of heat and moisture to which they have respectively become adapted, and also by the past history of each plant placing it in some one region, and not in all to which it is adapted; and finally that the active distributing agent, aside from the comparatively feeble efforts of the plants themselves and man's insignificant effects, has been the successive migrations compelled by past climatic and geological changes, and that these migrations have resulted in the distribution of all plants over the earth's surface into those definite groups or floras which

we have just considered,—which groups probably all came in a series of great waves from the north.

Discussion.

William C. Strong said the lecturer had spoken of the transportation of plants by glacial action and of the gradual distribution of species, and asked him whether he regarded the law of evolution as applicable to plants in such manner as to increase their hardiness, enabling seedlings of species belonging in the flora of a warm climate, ultimately, by a long process, to become inured to a colder climate.

Mr. Ganong replied that the gradual modification of the character and habits of plants was so general and so necessary to fit them to their surroundings in localities where they may be placed either by design or seeming accident, that the known facts could not be explained without supposing it, and it may be taken, to start with, as almost axiomatic.

F. L. Temple inquired whether the plants that were driven south, by the glaciers, far into the tropical zone and had returned, by Nature's slow process, to their original home, were then identical with their ancestors growing there in pre-glacial times.

Mr. Ganong replied that practically they were identical; that, although somewhat modified by the various influences to which they had been exposed during their absence, the intervening time had not been long enough to extinguish the characteristics of the species, some of which indeed are very old and are found fossil in the Tertiary strata.

Mr. Temple asked the reason that plants brought from the southern extremity of South America will not live here in our climate, or in the degree of latitude north, corresponding to their native habitat.

Mr. Ganong suggested that if plants were rightly selected in Fuegia they might live here. But the chances are against it in such cases, unless a gradual acclimatization can be effected. Special conditions, other than those mentioned of moisture and temperature, even if so slight as to be invisible or unknown to us, may become, in the case of wild plants, of vital importance in the face of the intense competition between species each striving to occupy as much ground as possible. The native plants are in possession and the foreigners are not sufficiently adapted to our climate to

cope with them. In case of cultivated plants, difference in conditions of moisture, etc., may be so different here as to prevent their growing even under cultivation. The great evenness of the Fuegian climate and the great extremes of our own, prevent many plants acclimatized to the former, from living in New England. This is proven by the fact that certain plants from the southern part of South America will grow on our Pacific coast, where the climate is much more even than our own.

Mr. Strong spoke of the lecture as one of great interest, and said that its full value will be better appreciated when it comes to us in print. We may not understand the bearings of so profound a subject, or be able to discuss it upon the simple hearing. He then moved a vote of thanks to Mr. Ganong for his instructive lecture, which motion was unanimously adopted.

O. B. Hadwen, Chairman of the Committee on Publication and Discussion, announced for the next Saturday a paper on "School Instruction in Horticulture and its Advantages," by Dr. Charles C. Rounds, Principal of the State Normal School, Plymouth, N.H.

BUSINESS MEETING.

Saturday, February 28, 1891.

An adjourned meeting of the Society was holden at eleven o'clock, the President, William H. Spooner, in the chair.

No business being brought before the meeting, it adjourned to Saturday, March 7.

MEETING FOR DISCUSSION.

The Study of Horticulture in the Public Schools.

By Dr. Charles C. Rounds, Principal of the State Normal School, Plymouth, N.H.

Dr. Rounds prefaced his essay by the remark that he was not a horticulturist nor a naturalist, but that what he should say would be spoken out of the depths of his feeling of his own needs in youth, and of the needs of the children of the present day. If his

message should prove not exactly fitted to the needs of the members of this Society, the defect must be attributed to his want of technical knowledge. He then read his lecture, as follows:

The demands so earnestly and widely made for revision of courses of study, from the lowest class in the primary school to the university, is not a freak. These demands are to be met, they must be calmly considered, and reasonable claims must be granted. There can be no fixed course of study best for all persons and in all times. Revisions are compelled by changes in the circumstances of the individual, by new demands which new times make upon the citizen, by discoveries in science and the arts, by new social and civil conditions; and educational systems must be judged, not by their fitness to meet conditions which have passed away, but by their adjustment to the demands of their own time.

If the tremendous inertia of whatever has become institutional be borne in mind, there need be little apprehension of wide-spread disaster from too rapid or too radical changes in courses of study, though such apprehension is not unnatural to those whose field of view is limited. The realized dreams of the wildest visionary could hardly effect so great a change in the schools of the present day as has been effected in passing to the great University of 1891, from the Harvard College of the middle of the seventeenth century, where it was prescribed that "when any scholar is able to read Tully or any like classical Latin author *ex tempore*, and make and speak true Latin in verse and prose, and decline perfectly the paradigms of nouns and verbs in the Greek tongue, then may he be admitted to the college, nor shall any claim admission before such qualification;" when the conversational use of Latin was obligatory upon all within the limits of the college, in place of the mother tongue, which was "to be used under no pretext whatever, unless required in public exercises;" when it was ordered that "every scholar that on proof is found able to read the originals of the Old and New Testaments into the Latin tongue, and to resolve them logically, withal being of godly life and conversation, and at any public act hath the approbation of the overseers and master of the college, is fit to be dignified with his first degree."

The immense changes that have been effected in the higher education since the year 1800, are well known to those now living.

The elder Silliman, elected professor of chemistry at Yale, in 1801, visited Professor Maclean, a young Scotch medical graduate at Princeton, and there for the first time witnessed a chemical experiment. Professor Cleveland, called to teach science at Bowdoin, took a small box of mineralogical specimens to Philadelphia to find a man to name them. Elective studies were adopted at Harvard in 1824, "against the judgment of the faculty." With the advent of Louis Agassiz, in 1848, Professor Pickering's Physical Laboratory at Harvard, in 1867, the general extension of laboratory work in chemistry, and later in biology, we have the laboratory method firmly fixed in science teaching, and slowly making its way downward.

The common school of the early part of the century, I need not describe. Some here probably knew it by personal experience,—more by tradition. Its type still survives in the back districts, though it would hardly be recognized in what we should now style the model school. Yet it may be doubted whether in its best form the transformation has been so complete as in the higher institutions, and whether the common school of the present day furnishes so complete a solution of the problems present to the people of the time as did the school of the earlier day.

All the conditions which have been enumerated as compelling revision of studies have been found prevailing with constantly increasing force for the last half century. Population is rapidly passing from country to city; the urban population of Massachusetts is now seventy per cent of the total. John Ericson, who died so recently in New York, was a working mechanical engineer in England, at the birth of the railway system, and a competitor for the prize offered for the first locomotive engine. Henry and Morse made the telegraph possible and actual in the second quarter of the century, and Edison is still in the prime of his marvellous powers.

The discoveries and inventions which have so increased the power of production and communication, have correspondingly increased the powers of intelligence. In the morning paper we read the most recent history of remote countries; combinations of forces in all departments of human action are speedily made on the most extended scale, and the range of the exertion of directive power is only limited by the powers of the individual mind. There is great significance in the statement of Francis Galton, that the average

intellect of the present day is not equal to the problems presented to it. This cannot be from a diminution of natural mental capacity, but from some failure in training.

It is a legitimate subject of inquiry, even though there be no ground for present apprehension, whether there are any but educational forms to remove the possibility of the world's seeing repeated the supremacy of the few and the subservience of millions marked by the ruins in the valleys of the Euphrates and the Nile.

The educational and social ferment of the present day is a necessary result of the instinctive effort to adapt one's self to the universe in which he is placed, an effort which becomes intelligent and volitional so far as the true relations to that universe are clearly perceived. Mighty civilizations have flourished and have then been overwhelmed and lost in the revolutions and destruction of empires. To trace the causes of their triumph and decadence is a legitimate exercise of the intellect, but this exercise is one of the luxuries of scholarship. Something else is needed to make a people citizens of their own time and participants in the culture of their own generation. However many lost arts there may have been; whatever the character of the sciences the knowledge of which may have disappeared, the sciences and the arts — not the *art* — which mainly give shape and direction to the civilization of the present day, are the growth of the last one hundred years, and most of the education which possesses real power at the present day is *new* education. There are only degrees of *newness*. As a necessary result of the newness of scientific and practical culture, there are gaps to fill out in the system, — there is imperative demand for improvement in method.

In this general discussion it has been my purpose to emphasize the fact that the question which the Horticultural Society this day raises is a part of that larger question of educational advance now moving the thought of the world. And now I would state some grounds for the conviction that the introduction of the study of horticulture into the common school course will supply a force still lacking in our means of culture; that such introduction is easily practicable in country and city schools, and that there is good reason to believe that such an extension of the course of study will serve, in some measure at least, to palliate, when it does not remove, economic, moral, and social ills, the existence of which we deplore.

As a rule new studies are introduced into courses of study on the ground of their practical value, and they maintain their ground therein unquestioned so far as they prove efficient as means of culture. Passing over for the present the discussion of the practical value of the study of horticulture, I will crave your forbearance for a brief discussion, somewhat technical — I fear somewhat dry — of the special culture to be gained from the study, and of its true place in a system of education.

In libraries we have the garnered results of the wisdom of the ages. If Rosenkrantz be right in his statement that it is the end of education to build up in the mind of the pupil a picture of the universe as mature minds have painted it, the library may suffice; if it be the true expression, as I must believe, that the aim should be to build up a picture of the universe as God has made it, we must supplement the study of the word by the study of the thing—the library by the universe itself. It is not the fixed forms of things alone which must be studied, but the powers by which things are produced and maintained, and the processes through which these powers work. If the thing is a pause in the Divine thought, the process is the Divine thought in working.

It is but a low type of mental exercise, yet an essential one, which consists in the mere transference to the memory of words and of notions of things. Real thinking is a more complex process, and knowledge is the result of thinking in a larger sense. The mind grows only by exercise, and care must be taken that it be exercised in the right way and in all essential ways. All processes of thought consist in the separation of wholes into their constituent parts, or the combination of parts into a whole. Since all thinking deals with real things or with previously acquired ideas, we have, as the essential forms of thought, analysis and synthesis, dealing directly with real things or with previously acquired ideas, or, in other words, real and ideal analysis and synthesis. To illustrate from your own special field: — in passing from the real plant as a whole to the observation of its parts, the process is one of real analysis; in following the development of the plant from the seed, the process is one of real synthesis. If the mind, reproducing previously acquired ideas of similar plants, drops specific differences and combines common features to form ideas of genus, order, etc., it is engaged in ideal analysis, as going from the concrete thing to the abstract idea; if the mind,

starting from the general abstract idea, *plant*, adds to it the ideas of class peculiarities in order — the process of the botanist in classification — the process is one of ideal synthesis.

This sketch covers in outline the field of intellectual education, and an educational system must supply the appropriate subject for each of these classes of mental exercise. All are essential to complete culture, and each has its appropriate place and peculiar efficiency. Every mind must start with the real, and most will find here their appropriate field of exercise. Only philosophers and scientists work easily in the the ideal region, and it has been the bane of our education that abstractions have for so long ruled the field, and have been the main exercise of minds but poorly prepared to deal with them.

If it were enough to study one branch of science, if the object were merely to illustrate a process of thought, the work of the teacher would be simple indeed, and the years of study might be few. It does not require argument to prove that the study of all the forces acting through matter is essential to anything like complete culture; hence the divisions of physics according to the forces considered. In addition to the physical forces, vital forces, as acting in plant and animal, must be studied for essential knowledge and also for discipline. The predominance, in our courses of study, of the study of the animal organism, is probably due to the interest excited by the evolution theory. There are apparently insuperable obstacles to the general teaching of this department of biology in the common school. It requires a training and skill beyond the reach of most teachers; the subject in some of its aspects is repulsive to many children, and the study of the processes and laws of the development of animal life is often unfit and impossible for the child. The knowledge of facts alone, however interesting and important in themselves, is not science, which must always sweep full circle. The astronomer studies the laws of planetary motion by comparing the observations of past centuries with his own. The geologist deduces the laws of his science from comparison of stone records reaching through the vast periods of geologic time; the biologist traces the laws of animal development through successive generations. In the study of the plant the circuit of development may be complete in one season; modifications are easily produced and observed, and the subject is at all times and stages beautiful.

To recapitulate:—The four essential processes of thought — real and ideal analysis and synthesis — must all be made subjects of exercise in a system of education. If man is to be at home in the world which he inhabits, he must know not merely things,— he must also be trained to observe the action of the classes of forces by which things are produced. The study of physical forces must be supplemented by the study of these as combined with life forces in the study of plant or animal. The laboratory method must be adopted. The biological laboratory is often impossible; the garden is the botanical laboratory.

Can the means of such teaching be supplied? I must leave it for you, gentlemen, to decide how much good ground is essential to the school garden. There is surely ground enough in the country, and attached to the city school there may be. I found a fine collection of plants on the roof of a school house built for the poor of East London, the boy's playground being also on the roof, and those who have seen the beautiful flower garden on the roof of the market house on Princess street in Edinburgh, will have a vivid idea of the possibilities in this field.

Is such an extension to school work anywhere found? Yes, and as part of a national system, I will read the course in horticulture prescribed by law for the common schools of France, and the course by which teachers are to be prepared in the Normal Schools for the direction of this work. In France, whatever is to be in the education of the people must be in the normal schools. The problem of manual labor was solved there by putting it into the normal schools.

Horticulture takes a place beside agriculture in the courses of study of the normal schools and of the elementary or common schools. The course for the third year of the normal schools for male teachers lays down the following as the subjects treated, under the title, *Fruit and Vegetable Horticulture.*

1. The site (for garden); preparation of the soil; planting.

2. Special culture of trees and shrubs: The vine, the peach tree, the cherry tree, the plum tree, the pear tree, the apple tree, the rose, etc.

3. Grafting.

4. The vegetable garden. The teacher will give special attention to the modes of cultivation and the varieties of plants most important in the section of country in which the school is located.

In the normal schools for female teachers, the instruction in horticulture constitutes a part of the course in domestic economy for the second year, and the subjects are treated in the following order:

The Garden.—General arrangement of the garden: walks, borders, walls, trellises, garden work and use of the various garden tools.

The Fruit Garden.—General principles of the culture of fruit trees, with application to the varieties best suited to the region. Diseases of fruit trees. Destruction of noxious animals.

The Vegetable Garden.—Varieties, cultivation, and harvesting of vegetables. Harvesting, sorting, keeping of grains. Forced cultivation—the hot-bed, the frame, the bell-glass.

The Cultivation of Flowers.—For ornament or for the making of perfumes.

The course for the elementary schools is in general as follows:

Primary Course.—(Pupils 7 to 9 years of age.) Fundamental ideas gained in the school garden.

Middle Course.—(Pupils 9 to 11 years of age.) The instruction bears upon the elements of agriculture: principal kinds of soil, fertilizers, tools, etc.

Superior Course.—(Pupils 11 to 13 years of age.) Horticulture: principal processes of multiplication of the most useful vegetables. Arboriculture; grafting.

The completeness and comprehensiveness of the course in the young ladies' normal schools is especially noteworthy. In the normal schools for young men there is also a course in agriculture, and when it is borne in mind that in each of the eighty-six departments of France there is a normal school for young men and also one for young women; that the education of the common people is a national concern; that the schools are in session for more than ten months in the year; that the courses of study are prescribed by the superior council of public instruction; that school attendance is compulsory from the age of seven to fourteen, and that trained teachers must be employed, the prosperity, the contentment, and the patriotism, of the country people of France can be understood.

The care taken to prepare teachers in France for instruction in this line may be shown by some extracts from a report by M. Boutan, Inspector-General of Public Instruction; speaking for a commis-

sion of inquiry regarding instruction in physical and natural sciences, he says:— . . . . "The garden of the Normal School should always have a nursery of fruit trees, and a square reserved which we will call *the school of Botany.* The pupils will themselves graft the trees in the nursery from their entry into the school, under the direction of a capable gardener; they will thus learn during their three years' course, to train the trees of the garden. They will familiarize themselves with the most usual processes of pruning, and, without a great effort of memory, they will come to know the species of fruit trees which succeed best in the region,—those which, for the general good, should be propagated and made known. Later, when the Normal pupil has become a teacher in a rural community, and shall have a garden, he will take to the school some of the trees which he had formerly grafted, and will transplant them into his little orchard. We wish, in short, to reach this result—that the teacher's garden may be the best kept garden of the town, that it may serve as a type and example. Our country people are opposed to all ideas of reform and of progress when presented as theory and pure science, yet they will become zealous imitators and obedient disciples when example is added to precept—when they are presented with results obtained,—with palpable facts. If the teacher obtains fine fruits and good vegetables in his garden, we are sure that the farmers of the neighborhood will not delay in adopting his processes; that they will take his advice; that they will ask him for grafts, and that soon, and without the need of any other propaganda, good processes of arboriculture will become general. We can cite several departments in which, thanks to the happy initiative of the teachers, the wealth of the country has increased from year to year, and from which the exportation of fine fruit has become the source of considerable profit.

"The little school of botany, during all the pleasant season, will furnish to the teachers and pupils the living plants necessary for lessons and for practical work.

"What we have just said regarding arboriculture applies as well to market gardening. It is no more difficult, in a soil properly prepared, to produce good vegetables than good fruits. It is always during his residence in the Normal school that the future teacher will become acquainted with the traditions of intelligent practice. We note, as excellent to adopt, the custom followed in

some of the establishments which we have visited, of dividing the pupils, for garden work, into several groups. Each group, instead of devoting itself to labor without a result, continues to the end the kind of cultivation which it has commenced. It passes then to a different kind of cultivation, and follows this, too, from the sowing of the seed to the harvest. Following this course each group, during the three years' study, can become acquainted with all the processes relating to the cultivation of the different products of the market garden.

"This important question has been discussed by the commission: Shall the professor of agriculture be asked to consider horticulture, properly so called, as annexed to his course, or must the teaching of horticulture be given to a special teacher? The decision was unanimous for the second plan, for this reason: many teachers of agriculture, very able as agriculturists and as chemists, cannot give good instruction in horticulture; they have never thoroughly studied it; they have never practised it. The pruning and training of trees is known to them only in theory; market gardening is but little less strange. Their only resource, if required to give this instruction, would be to place a book in the hands of the pupil, and to explain the book. The final, inevitable result would be that instruction in horticulture, which we wish to see prosper in the Normal schools, would be sacrificed.

"Hence, we demand that a master-gardener be attached to each Normal school."

The school study of agriculture and horticulture is not peculiar to France among the continental nations, but in several others it receives prominent recognition, however strange this may seem to America.

In this we have another illustration of our educational poverty as regards our contributions to educational theory and practice. Manual training in our schools took its real start from the exhibit of the Moscow Technical School at Philadelphia in 1876, the great value of the theory and method of which was at once recognized by President Runkle, of your Institute of Technology, and others; for the present form of manual training in the common school we look to Sweden, and the adaptation of the Swedish "Sloyd" to the primary school is now brought to us by two sisters —one I believe in Chicago and one in Boston—from Helsingfors in far away Finland.

For physical training in school, Boston has adopted the Swedish system as the best; and the name of kindergarten, and of its author, Froebel, alike show its origin. Until America can show one important contribution of its own, there should be no objection to the adoption of one more educational feature from abroad.

The economic advantages have been briefly stated in the French report from which I have quoted.

The physical advantages in furnishing relief from the stress and strain and a remedy for the dangers of school life and work, as well as of sedentary occupations, are patent. Like advantages may be expected from the furnishing of needed changes in the food and hours and habits of life, of many of our people. One advantage of the study of horticulture in our schools would be that it might change the hours of the active life of each day, even in our cities, by substituting morning hours for those of the late evening. On a larger field the benefit would be felt in its transformation, in some important respects, of the character of country life.

The transference of population from country to city is one of the most marked characteristics of modern civilization. According to the last United States census the urban population of Massachusetts is, as before remarked, now seventy per cent of the total. Many of our States are apprehensive of their future in view of the large and increasing number of abandoned farms. Often sadder than the abandoned farm are the abandoned parents who are going down to death alone on the old place. It is by no means always true that the children who have gone from country to city have bettered their fortunes by the removal; too often they have bankrupted fortune and morals alike. Yet flight was and is inevitable,—it is an instinctive attempt to save the soul alive. To the bright boy and girl on the country farm comes day by day wonderful music from the wondrous world beyond the horizon's bar. In former days the lumbering stage coach brought news — a little — from abroad, as it had slowly travelled the length of the land and been slowly wafted across the seas. Now the express train, the ocean racer, and the magic wire over the mountains and under the seas, make the whole world kin, and inflame the imagination of the youthful watchers in the valley and on the hillside. The magazine comes with its reproductions of art, and its revelations of the beauty which cities have to show. The

summer traveller and the summer boarder come to disturb the dreams of the country maiden, and to emphasize the contrast between the actual and the ideal. With awakened intelligence and quickened taste the mind reaches out for appropriate stimulus as the flower turns toward the sun. And this actual life, so full of toil, so bare of charm — the home with no adornment within or without — you know it, for in your travels you must have seen it. In a day's ride across country so rarely can one see around the country house any hint of garden in the true sense of the term, that when once seen the sight will signalize that day's journey.

The summer homes of those who with more ample means seek gratification of the innate love for the real delights of country life, are marvels of beauty; but these being the creation of wealth and taste are quite beyond the reach of those who live on in the same old way, for lack of the training which is so easily attainable and so strangely withheld.

For another reason are the farms abandoned: their cultivation has become unprofitable. Under proper cultivation we know that fields are fertile after centuries of culture; many of our farms have had their wealth exhausted in three generations. The colleges of agriculture and the mechanic arts, with their four years' courses of scientific study, do not meet this necessity. The people are not given in the common schools even the stones of scientific culture. A large proportion of the farmers in this country have not learned that fertilizers can be taken up by crops only when in solution. They allow the rain to leach away all the virtue of the stock of manure, and put the sticks and straw upon their lands. In the country school not even the simplest laws of plant growth are taught. When in the academy or high school some most elementary knowledge of botany is offered to the few who reach these schools, the study usually covers only a part of the field. In our schools it is generally the case that botany is taught only in the spring; fruits are not studied at all, and the best methods of preserving them are unknown. Some seeds are sprouted in the school-room to illustrate the process of germination. The school grounds are never desecrated by the growing of plants; the kind and preparation of the soil, the selection and action of fertilizers, climatic conditions and their influences, the selection and use of tools, and the actual manipulations of the art,

remain to most of our farmers mysteries still, and generation follows generation in the same dull round.

The facts few will deny; the results we must deplore; relief must be sought and found, if not on this line then on some other, but what?

The economic advantages which would be derived from a wider diffusion of horticultural knowledge and a better horticultural practice need not be detailed before this audience. The physical advantages which pupils in school would derive from spending some time each day in these out-door lessons and exercises, it needs no argument to enforce, and if thus a love for the garden and its better and finer products could become wide-spread, there must result an influence of infinite value upon the habits and lives of our people.

Above and beyond all this, however, there are relations to the higher life of man which should not be left out of the account. In the physical laboratory the scientist deals with forces almost entirely under his control; in the garden the thoughtful pupil sees himself working with forces beyond his control,—forces running toward grand, harmonious, beautiful, beneficent ends, on lines laid down by an intelligence infinitely beyond his own. If the "undevout astronomer is mad," the gardener who cannot discern the spiritual significance, the infinite suggestions, of that with which he deals, must be akin to the clod he turns. There is something in the culture and study of plants that carries the mind outward and upward toward the Infinite. I shall never forget the look, deep beyond his years, of a little boy, much in love with plants, as he broke in upon the conversation in the garden, as the sun was setting, with the question, "Do not plants think? I thought they did." That boy, before taking any lessons in botany had three hundred specimens in his herbarium. The boy has become a man, and a lawyer in New York, but his love for Nature is as strong as ever, and his vacation rambles and studies keep his thoughts fresh and young.

The beauty and the grandeur of natural scenery are beyond the appreciation of many; they often appeal to us with a power which exhausts while it uplifts; we can read their deepest meaning only in our rarest moods. An added meaning and an added grace is given to Nature by the skilful and loving hand.

In the course of study in our common schools no provision has been made hitherto for cultivating a taste for natural beauty.

Although wide districts of our country have been occupied for generations by farmers and their families, many of these dwellers in the midst of our most beautiful, and even grand scenery, have been quite unaware that it possesses such characteristics. A cultivated citizen of Philadelphia discovered North Conway, and his announcement of its charms led to its becoming a fashionable resort for summer boarders. A party of summer tourists wandering over the White Mountain district noticed at one homestead that the barn was so placed as to completely prevent the house from commanding a view of Mount Washington. The farmer, on being asked why his barn was thus located, replied: "When that barn was built *Mount Washington hadn't been discovered.*" The cultivation, in the rising generation, of appreciation of the beautiful in Nature and art would add greatly to their capacity to perform better work in every vocation, especially rural, as well as to their ability to see and enjoy the charms, not only of fine productions of art, and of beautiful and grand scenery, but of all created things. Furthermore, their development in this direction would exert a reflex influence upon the present generation and thus increase the happiness of the whole race.

We read in the beginning of the divine record that God planted a garden eastward in Eden,—and that he placed man therein to keep and to dress it. On the cross the Saviour of mankind said to the penitent, "This day shalt thou be with me in Paradise,"—a pleasure garden. Were there more gardens along the way, the course through this world to a beautiful hereafter would be straighter and smoother.

Dr. Rounds remarked during his lecture that by the extension of courses of instruction in natural science to young women, the fact has been recognized that it is a study entirely appropriate for them.

It is remarkable that, so far as he knows, farming and gardening are the only occupations carried on for fun. Wealthy men go back to their homes or farms in the country and spend money for beauty, but merchants and teachers do not go back to their occupations.

If we take a piece of natural scenery and work it up by the aid of man and it is controlled by man, a new life is given it.

Whatever may be said in the city we know that in times of trouble help is sought from the country. Solitude makes a coun-

try boy thoughtful if he has the capacity for thought. He is brought in contact with a power beyond his reach. The deepest religious sense of the world is connected with communion with nature.

Discussion.

Rev. A. B. Muzzey said that if the presentation of this subject had taken hold of others as it had of him, it was a happy circumstance that they could attend this meeting. When he saw this subject in the list for the season, he thought it the best of them all; it strikes at the root of all the operations of this Society. He would throw no discredit on those who follow the business of horticulture for profit; but he was amazed to see how much some men care for the accumulation of money while they care nothing for beauty. They appear not to comprehend the love of Nature. He stood not long since talking with a man successful in business and possessing a large property, and expressed to him his admiration for a fine orange tree full of fruit, near which they stood. The man replied that he thought the oranges could be raised for seventeen cents apiece. Now that man could not see anything in the plant beyond its market price; but his remark gave the speaker a shock from which he had as yet hardly recovered. He would have every child so educated as to be able to appreciate beauty, especially the beauty of Nature, from that in the commonest things around us, up to the beauty and grandeur displayed in the order and glory of the heavenly bodies. How can a mature person see nothing in the objects around him but their pecuniary value? He was glad to have lived to see a special effort made to interest children in gardening, but even yet there is not enough interest taken in it. The love of beauty should be called forth and developed in the rising generation. The young no less than the middle-aged of the present time should be led to put their hearts into this work, as one of the most effective means of elevating the present, as well as coming, generations. It should be done unitedly, and by all means and methods, up to calling the attention of government to the matter. While children should be trained intellectually, we ought no longer to neglect a culture of the love and appreciation of the beautiful.

Henry L. Clapp asked, What is the object of these discussions? If not intended as a means of education he did not know their

purpose. It has been said, "If you would teach art, Boston is a good place to begin"; but how about horticultural education? We are a Society with a large property and a large income, of which a round sum is annually offered and paid out in prizes. In view of this many people come here and take prizes year after year, and yet, when it is proposed to spend any money to instruct children in horticulture, they say this is not a charitable institution. He believed that Boston *is* the place to begin the work of teaching children horticulture, and not only the theories, but the practical art of it; and that this Society is the most proper organization to initiate that work. In reply to a question by the President, as to whether the Sloyd system should not include horticulture, Mr. Clapp said that the Sloyd system pertains solely to working in wood, with the object of gaining dollars and cents at the end of it, and from its adoption would come only danger of suppressing horticulture.

Leverett M. Chase was pleased with the subject presented and gratified by the essayist's method of treating it. He stated that the movement in this matter, commenced by this Society, had resulted in an application to the City Government to have the arable portion of the school grounds put in charge of the City Forester, and the question would come up before the City Council very soon. He would ask the aid of others here. It is painful to know that so much thought is given to getting money, or devoted to material things, and to see how far the infinite energies of the soul are wasted. While these things are not to be despised, they should not take the first and best thought. There is too little thought bestowed upon spiritual welfare — upon the cultivation of soul life, that it may be elevated and that we may be the better fitted for this life and for the life to come.

Caleb Bates remarked that being past three score years and ten, he was nearing the end, but always felt an interest in the proceedings of these meetings; that he did not know when he came here today what was to be heard, and would have liked to have a few moments to collect his thoughts; but he saw by the remarks of the last speaker that the audience felt the elevating tone of the essay, which had affected him greatly and he would like to say what was unusual in meetings of this character. All are willing to acknowledge that all the natural things in our gardens were made by God, and therefore must be images of principles in the

Divine Mind, and the original must be in the Paradisiacal garden, and what we see here are but imperfect clay models of the original. Thus if we put aside old blinding dogmas we could look through these things right into the spiritual world and see in a degree the things to which they correspond.

By correspondence our growth is represented in the first Psalm as the growth of a tree; a godly man as a thrifty tree growing by a river, and depicted as a well-developed being, able to appreciate the good, the true, and the beautiful; but the ungodly are not so, but are like the chaff, undeveloped. Were the young taught the art of horticulture, the love of nature thereby engendered would be elevating, helpful in cultivating the faculty of appreciation, and would sometime enable them to see and love the good, thus preparing them for the better world.

Rev. Calvin Terry was much interested in the essay; it pointed in the right direction. In former times it was common talk that people did not need much book-learning to become farmers. Now it would sometimes seem that a farmer to be successful, needed all the wisdom and all the learning in the world. But of all the branches taught there are none that give breadth and solidity to character like these horticultural studies. He said the Life of George Washington was one of the first books he read, that he remembered. Everybody has read or heard the story of George and his little hatchet, but he would call attention to another. George once found in the garden, his own name, growing up out of the soil, and ran to his father for an explanation of the wonder. This was given in a religious lesson, illustrating the beauty and wisdom of Divine planning, as well as its necessity, and the omnipotent power of God as displayed in all things. Such experiences in his childhood did more to make the immortal Washington, than all the political influence that was exerted in his favor. Everything that has life in it thinks after its fashion, for God is in it, and he is all thought. "All things in Nature are beautiful types to the soul that reads them."

"Cities grow west," but the speaker was happy to say that he had always grown toward the east. In his garden there is nothing to intercept the rays of the rising sun, and he liked to be there and see their first glimmerings. He wished that all children could be taught to appreciate the first hour of morning with all its fresh beauty, music, and brightness. He thought

such children, when grown to mature years, would not be apt to run away with the funds of savings banks, or other trusts; for they would see God in everything and be impressed always with the thought, "Thou God seest me," and would not dare to sin.

Mr. Clapp said that he had been interested in all the preceding discussion, but was far more interested in the work of educating the people in horticulture; that one stroke of work in that direction was worth more than all the expressions of theory that could be uttered. The saying that this Society is not a charitable institution may be true, but it *is* an educational organization, and he would suggest that if the Society should spend a thousand dollars in establishing school gardens it would do more to promote the objects for which it was founded than could be accomplished in any other way.

Dr. Rounds held up two small books published in Paris, costing to import, one thirty cents, the other forty cents. One, a first-book of agriculture and horticulture, "Le Petit Agronome," was a text-book for the elementary school. It treats of soils and their management, of plants and the modes of cultivation, of domestic animals, their hygienic treatment and their diseases, and of various other matters of great importance to the farmer. The other book was a story of country life, showing the sure reward which comes to the boy who by industry and frugality makes the most of his opportunity on the farm, and the miserable loss which attends the opposite course. One of the characters in the story, M. Barron, after accumulating a fortune in business in Paris, attempts the *rôle* of gentleman farmer, and wastes his capital in experiments which a practical knowledge of farming would have prevented. His wife and daughters scorn the duties of the new position, and persist in continuing in the country the employments and the styles of Paris. The inevitable result, financial ruin, speedily follows. This little book is illustrated with a hundred and sixty engravings, and weaves into the interesting story of life on the farm a systematic treatment of rural economy, and presents a course of illustrated object lessons on the plants, insects, and animals which the farmer needs to know. He knew of no books within the reach of our schools of the character of these, or approximating to them. There is nothing in our common schools adapted to give a love for country life or such knowledge as the farmer needs. On the contrary, our teaching tends almost exclu-

sively towards mercantile pursuits. Nearly all the practical problems in our arithmetics are mercantile,—there is hardly ever one relating to manufacturing, and it may be said never one relating to agriculture. The examples in the text-books on book-keeping are drawn from the store, the bank, and the railroad. It is easy to see that with such text-books the school training and general instruction now given must tend strongly to draw our youth away from the farm, the garden, and Nature, notwithstanding the almost universal natural inclination of childhood to enjoy working in the soil and seeing and cultivating flowers and other crops. Under these circumstances there exists a great need that a strong movement be made to secure the introduction into the schools, of a newly arranged course of study, in which the interests of agriculture and horticulture should have the full share of attention to which their relative importance entitles them.

William H. Bowker alluded to the query, Is it expedient to put more into the curriculum of our schools? and then declared he was heartily in sympathy with Dr. Rounds, and not at all so with the objection that the school course is already crowded. He had with him at his farm last summer, two bright Boston boys, now going through the Latin School; one his own son, the other the son of a city friend. He was one day going over the farm with them, accompanied also by five English boys — sons of his foreman — of whom two were of the same ages as the American boys. As they passed along he would ask questions about various objects they saw,—plants, rocks, water, air, etc. The Boston-taught boys knew nothing about them, but the English lads answered nearly every question. He then asked the names of the capitals of the countries of South America,—also questions about the regions in Africa in which Stanley had travelled so widely. The New England boys were quite ready to give answer to these questions, of which the English boys had not been taught. They had, however, been taught to observe and study Nature,—the things they could see; the Boston boys, on the contrary had not been taught to study *things* around them, but to study *about* things distant from them. Even our country-bred boy or man does not appreciate the great resources of the country for enjoyment; beautiful scenery in combination,—mines of knowledge and exquisite pleasure if studied in detail. He was glad to hear of a proposed course of training in "art appreciation," and believed it would be well to

introduce such a course into agricultural colleges and also into other higher institutions of learning. Indeed, he approved the idea of Mr. Clapp, that this Society should appropriate money to begin such training among the school children. He once offered to pay the Boston boys to make collections of bugs and plants to learn about them, and soon found that a little girl of four years had developed an interest in the pursuit, and followed the example of her elders. He asked why can we not teach the children of this country to know the common things around them before we try to teach them abstract principles.

In reply to Mr. Bowker, Mr. Clapp said there was no need of taking out any studies in the present course of instruction in Boston for the purpose of teaching horticulture, because the School Board had directed that two hours each week should be given to the study of natural history in the three lower grades of the grammar schools. The time had not been spent as directed, but had been given to those studies which seemed more likely to result in dollars and cents.

Mr. Chase said that examination papers contain no reference to these studies. Our system of education pushes the attention of children to the outward and downward, toward the getting of money. Our boys are brought up to worship the "almighty dollar." We must educate the people better, giving more attention to observation of the beautiful and sublime, as well as the useful in the world of Nature. He remembered that when making the passage over Lake Champlain, there were a man and his wife in the party. The gentleman took a good position for observations of the fine scenery and any other attractions which were visible, while the lady established herself in a comfortable seat, and devoted her attention exclusively to a ten-cent Beadle novel. She was fashionably dressed, and had the air of one whose husband was a successful money catcher, but so far as any pleasure or other benefit which the trip afforded her was concerned, she might as well have been at home or in an attic parlor of a sixteen-story hotel in the city, with the book in which her mind was wholly absorbed. We are, as a people, getting developed in body and mind by pursuing low roads. Most of our people seem to prefer to amass money enough to spoil their children, instead of so educating and training them as to fit them to make an independent living for themselves. As a consequence, the

children think, "Father has money enough," and therefore they will do no work. Labor is the primal blessing, and although the speaker believed in teaching arithmetic and the other useful branches in the school course, he would have more time given to out-door culture, as in the French, German, and Swiss schools. Upon the introduction of School Gardens, it might be necessary to call the first boy to take a lesson in it, but the next boy would go right in. Boys should not be taught as if they were all to be college professors. Now, when they go to Harvard, they are not examined to see what they know about plants, but about Greek exceptions.

Dr. Rounds referred to the French system again. The school authorities there, decide what the branches taught in each school shall be, and assign a certain proportion of time for each. A place in the programme must be found for each, and it is found. It is no infliction upon the pupils of a French school to say "Now we will go into the garden." More time is given to school work there than here, but the pressure is not so great and the children are not over-taxed under this system. If horticulture and manual training are introduced into our American schools, they could be added to the course as rewards of merit. He could not believe it would be any worse for our boys to be busy in the school grounds than to be standing around the streets. As matters now stand he could see no way to effect this object except to convert the school committee, and get them to say that a certain portion of time *shall* be given to these studies, and see that it is done, for they are quite as important as true discount or common multiples.

Mr. Clapp said that our educational institutions and business enterprises gave foreigners the impression that if they came to this country, they should be pretty sure to get rich, and, therefore, they came here every year by hundreds of thousands. He added that our national emblem is the American eagle, bearing in his beak a ribbon upon which is written "E Pluribus Unum," which means little or nothing to foreigners; but if the inscription should be changed to "The Land of the Almighty Dollar," it would be full of significance to them. The ruling ambition, prevailing everywhere in this country, that children shall be educated so as to earn their living as soon as possible in the first place, and make as much money as possible afterward, is so strong that most

teachers are influenced to spend the time wisely set apart by the School Board for natural history work, upon other studies, more in line with mercenary motives. So they do not carry out the authorized programme.

Herbert H. Bates, being called upon, said he had been much interested in all the proceedings of this meeting. He thought Dr. Rounds struck the right chord when he said that in gardening we are dealing with forces over which we have no control. To correct a misunderstanding — as he was introduced as teacher of physical sciences in Cambridge — he said there was no provision in the course of study for teaching elementary science in the schools of Cambridge. But there is in Boston, although it seems that it is not observed.

Dr. Rounds remarked that new buildings were being erected for the State Normal School of which he is the Principal, and he hoped to succeed in persuading the Trustees to allow one portion of the property to be used in the interest of horticulture. He had no doubt time would be found for teaching the branches in that department. How beautiful it would be if we could generally have provision made for school grounds of sufficient extent, which in time would form school parks. He then referred to the Reform School at Red Wing, Goodhue County, Minn. The grounds of this institution are ample, and are enclosed by a substantial fence, but the gates are never locked, and there is no appearance of a prison about the premises, yet there is seldom any trouble from efforts to run away. The inmates, both boys and girls, are trained in horticulture, and such is the interest they take in their duties that they find the establishment a very happy home. They boast that in one department of the work, the production of plants, their sales amounted to $1,500 in one season. A fire occurred there some time ago, which caused great excitement among the inmates, and they ran about in wild confusion at first, and people who came to assist in extinguishing the flames, declared that these young prisoners were escaping; but the Superintendent said: "We must put out the fire the first thing." After the flames were subdued, the roll was called and not one of the number was missing. Of course hereditary influences are often manifested, but such is the effect of the system of treatment while there, that, as the records show, less than ten per cent of the graduates fall into the hands of the law after leaving the

school, although without this training not ten per cent would be able to avoid that fate. As much time is given to training them to work as to book instruction, but the elevating influences of the institution are educational and prove very advantageous and beneficial to every one sent there. Dr. Rounds considered it a model of its kind.

O. B. Hadwen moved a vote of thanks to Dr. Rounds for the valuable lecture he had delivered before the Society, which was unanimously passed.

The Chairman of the Committee on Publication and Discussion announced for the next Saturday, a lecture, under the John Lewis Russell Fund, on "Diseases of Trees Likely to Follow Mechanical Injuries," by William G. Farlow, Professor of Cryptogamic Botany, Harvard University, Cambridge.

BUSINESS MEETING.

SATURDAY, March 7, 1891.

An adjourned meeting of the Society was holden at eleven o'clock, the President, WILLIAM H. SPOONER, in the chair.

No business being brought before the meeting it

Adjourned to Saturday, March 14.

MEETING FOR DISCUSSION.

DISEASES OF TREES LIKELY TO FOLLOW MECHANICAL INJURIES.

By WILLIAM G. FARLOW, M. D., Professor of Cryptogamic Botany in Harvard University, Cambridge.

Ladies and Gentlemen:—On several occasions you have listened to addresses on the subject of diseases of plants and the nature of blight, mildew, rust, and smut, and the habits of the fungi which cause them must now be more or less familiar to you all. I, therefore, shall not attempt, today, to speak in detail of any of the diseases just mentioned, but I am glad that I have been able to accept your invitation to address you at this particular time, because there is another subject of great importance, as

it seems to me, especially for the people of Massachusetts, on which there is wide-spread ignorance and general indifference. If I can succeed, even to a small extent, in diminishing popular ignorance of the matter to be discussed here, it is to be hoped that the present indifference will gradually disappear, for, as has been the case hitherto, the members of this Society can be trusted to do missionary work in arousing the public to a sense of what should be done to remove existing evils.

As far as the diseases of fruit trees and garden plants are concerned, the public have their eyes open and they require little urging to lead them to seek proper means for checking the growth of the fungus-parasites which affect the pocket by injuring the crops, or diminish our æsthetic enjoyment by disfiguring our gardens and greenhouses. But with regard to our shade trees and forest trees there is general indifference and, although what I have to say may appear to be more appropriate for a forestry association than a horticultural society, I have confidence that my hearers will allow me to use the word horticulture in a large sense, and will recognize that this community looks to them as the authorized promoters of all that tends to the welfare, not only of fruits and flowers, but also of our shade trees, which, if well cared for, are both beautiful and useful.

It is a mistaken notion that shade trees do not need care and protection. Nevertheless most persons believe that, unless a tree is to bear marketable fruit, it can be left to take care of itself. Those who live in the remoter country districts might perhaps be pardoned for holding this belief; but those of us who live in thickly settled towns ought to know by this time that the life of shade trees, exposed as they are to the unfavorable or even injurious conditions of the soil and atmosphere of manufacturing districts, is a precarious one. We have all seen the older trees killed off, and know that with each succeeding generation the younger trees are inferior to the older, for those which escape the injurious action of the soil and air are too often injured by the wilful violence of men.

Theoretically, if one is asked what the trees in our streets are good for, he would say, to serve as shade in summer and to beautify the town at all seasons. Practically, however, many people believe that the great use of the trees is to serve as supports for telegraph wires, as ladders for telephone workmen, or

as convenient places for fastening horses. In short, that a tree should be so treated that it may develop a symmetrical form and luxuriant foliage is nobody's business, while, on the other hand, it is assumed that it is the right of every one to fasten his horse to any tree he pleases or to use the branches as supports for wires. The march of improvement, as it is called, never respects the trees. If a sidewalk is to be widened, down go the trees, or their roots are chopped off in such a way as to injure them. If some enterprising man wishes to build a new house on the site of an old one, the old house is sold for a song and is moved off to some distant part of the town, being dragged along through narrow streets crushing and maiming the trees on the way, just as if these public ornaments were of no account compared with private gain. In fact, it sometimes seems as if a good many people believed that one could not do anything to a tree which really would injure it, and that a tree is so constituted that it can grow on in spite of all obstacles.

We should begin by recognizing that a tree is a living thing which is not only readily affected by the soil and atmosphere, but is also sensitive to mechanical injuries to a degree which might not at first be suspected. An animal tells us by its actions when it has been injured. We know the injuries done to trees only by the after effects, which may not be evident for months or even a few years, and it is my special purpose today to call your attention to some of the injurious effects which follow mechanical injuries. The subject is rather complicated and implies some knowledge of the microscopic structure of trunks and branches, but I shall endeavor to avoid technicalities as far as possible.

Before we can understand the harm done by mechanical injuries we must first consider briefly the normal structure of the trunk. If we examine with a microscope a cross-section of a very young twig, we find that the surface is composed of a single layer of thin, colorless cells called the epidermis, beneath which are several layers of larger cells, many of which contain green coloring matter. Then come the vascular bundles arranged in a ring, although they are not really in contact with one another but are separated by what we may call the rays, which pass from the pith to the outer green cells, and are composed of cells not unlike the latter in shape, that is, spherical or polyhedral, or some simple modification of these forms. A longitudinal section

through the vascular bundles shows that the cells of which they are composed are, in great part, very much elongated, so that they may be called fibres, ducts, or vessels. When seen in cross-section, each vascular bundle is wedge-shaped, and, if carefully examined, is found to consist of an outer and an inner part; that is, in respect to the circumference of the tree. The inner portion develops into the hard wood of the stem, while the outer part becomes a portion of what, for want of a better expression, we may call the inner bark, or bast. Between the outer and inner parts of the vascular bundle is a thin layer of small, colorless, brick-shaped cells, the cambium. The cambium is the most important part of the stem, since its cells during the season of growth are constantly forming new wood cells on the inner side, while those on the outer side are forming new cells of the inner bark. The cambium itself does not vary much in thickness at different ages, and, extending continuously throughout the length of the stem, forms the circumference of a cylinder whose diameter increases from year to year. It is important to bear in mind that it is essentially the cambium which is the growing formative part of the stem, whereas the wood cells formed constantly on its inner side soon cease to grow and, although their walls become thick and hard, the cell contents disappear, so that the cells of the hard wood are practically dead and unable to produce new cells. They form a series of hard tubes very important in the economy of the plant, by giving strength and rigidity and serving as means of passage to liquids and gases.

We must consider especially the action of the epidermis and the cambium. As has been said, the colorless epidermal cells differ from the cells beneath them in being thinner and flatter. The latter include the chemically active cells which in the younger parts of plants transform the food elements into special substances of use to the plant.

The epidermal cells, on the other hand, form merely a thin, protective membrane. They serve in the first place to check evaporation and, furthermore, their outer wall is usually transformed into a cuticle which is nearly impervious to water and is unaffected by a good many substances which would injure the walls of ordinary cells. An important property for us to consider in this connection is their ability to resist the growth of the mycelium of many fungi, which, when the epidermis is removed,

are able to make their way to the more delicate and succulent cells beneath, a point to which I shall refer later.

As the cambium constantly increases in circumference and the new wood and inner bark increase correspondingly in bulk, it is plain that the epidermis, unless endowed with the power of increasing in circumference, must soon be ruptured, thus exposing the more delicate cells beneath. The epidermis does not possess this power except to a very limited extent, but to avoid the danger which must follow an exposure of the sub-epidermal cells to the air after the rupture of the epidermis, which must inevitably take place early in the life of a plant, nature makes provision for the transformation of the sub-epidermal cells into a zone of cork cells, which act as a protective sheath after the epidermis proper is ruptured. The way in which cork cells are formed is seen on a small scale when a potato tuber is cut in halves. The wounded cells shrivel and die, but the more or less spherical cells beneath become divided into a series of thinner, flatter cells by the formation of new cell walls parallel to the cut surface, and the walls themselves become tough and resistent. The epidermis of the stems and branches in reality remains intact but a short time, usually only one year, and then is ruptured and soon disappears; but, meanwhile, the sub-epidermal cells, having been changed into a series of cork cells like those mentioned in the cut potato but on a larger scale, form a new protective covering which replaces the epidermis. Furthermore, the new cork layer itself is only to a moderate extent capable of extension, and as the inner parts of the stem continue to increase it is in turn ruptured, and the breaks are closed by the formation of a second layer of cork cells beneath. This process is repeated indefinitely, so that in stems several years old, we have what is in popular language called the bark, composed of several different layers of cork cells more and more split up and cracked externally.

If we now recognize the structure of the normal stem or trunk in its essential points, we can next consider the primary effects of wounds. In the first place, whenever a trunk or branch is wounded, no matter whether by the action of wind or snow, by the bites of animals, by pruning, or by wilful violence of man, nature itself attempts to heal the wound if possible. If the wound is not too great, it heals by natural processes, but many wounds are so large or so severe that even in the course of several

years nature cannot close them. In such wounds disease is likely to arise, which will infect the whole tree, unless man comes to the aid of nature. Let us then consider the question of the manner in which nature acts and to what extent. The two natural protective processes when trunks and branches are wounded are the formation of cork cells and the formation of a callus. The two processes may go on together. If the wound is slight, as when the outer bark is scraped or gnawed off, so as to expose the more delicate cells beneath, a new formation of cork may be sufficient to close the wound. But when, as is very frequently the case, both the outer and inner bark are torn away, exposing the wood, or when a good sized branch is cut off or broken off, the healing process is quite different. You have frequently seen the scars left when branches have been cut away and know that the edges of the wound swell and form a thick, rounded rim which in course of time seems to contract around the wound, and, if the wound is of moderate size, finally covers it. This thickened rim is what is called the callus, and it originates mainly in the cambium which was exposed when the wound was made, and to some extent in the adjacent cells of the inner bark.

To understand what takes place it will be best for us to suppose a simple case of wounding, such as that of a branch six inches in diameter, let us say, which has been carefully sawn across so as not to loosen the attachment of the bark to the wood. The greater part of the exposed surface here would consist of the wood proper with a comparatively narrow circle of the coarse outer bark and the more delicate inner bark. Between the wood and the bark is, of course, the cambium, represented by the circumference of a circle quite insignificant in thickness compared either with the bark or the wood.

Of the exposed parts the wood itself is practically unable to take any active part in the process of healing. It presents a series of open tubes, which are incapable of producing new cells. The cells of the cambium and, to a less extent, those of the inner bark and of the rays which lie near the cambium, are able to produce new cells, and hence, in the case we have chosen as an illustration, there would arise a ring of new growth just around the wood and beneath the bark. This raised ring of new growth is the beginning of the callus.

It is a well-known fact that where the cambium is exposed in wounds, it produces new cells more vigorously than the cambium of uninjured stems. The reason for this, at first sight, anomalous state of things will be easily understood if we call to mind the tension of any normal trunk. A trunk may be regarded as a cylinder composed of a solid axis of wood whose circumference is formed of the actively growing cambium encircled by the inner and outer bark, which taken together we may now, for convenience's sake, call the cortex. The different parts of this compound cylinder grow under different tensions. On the one hand, the inner parts, as they grow, exert a strong outward pressure on the cortex, while, on the other hand, the cortex acts as a sheath which exerts a strong pressure on the parts within. That when the normal pressure is interfered with, the relative growth of the different parts of the stem is changed, is well shown if a slit is made through the cortex to the region of the cambium. The cells of the cambium thus freed from pressure from without grow more rapidly than before in the direction of the slit, so that the wound thus made is rapidly filled by the new cells thus formed, and the new growth may even be so great as to more than fill the gap, and cause a slight protuberance on the wounded side. Furthermore, when the tension of the cambium is relieved by the removal of the cortex, its function of producing new wood cells on its inner side is altered, and microscopic examination of the new wood formed in wounds shows that the wood cells are shorter, and the vessels decidedly less numerous than in normal wood.

The description which I have given of the way in which the callus arises, although you may perhaps think it somewhat complicated for a popular lecture like the present, is, in reality, a brief attempt to sketch the process in its main points only, omitting many details which are of interest to specialists. What I have described is the normal mode in which the healing process begins, and is to be seen in those seasons of the year when the cambium cells are active. During the colder months of the year, however, the cambium is in a dormant condition, and if wounds occur at such seasons, the cambium is not able to form a callus at once, and the process just described does not begin until the season of plant growth returns. Meanwhile the exposed parts will probably have been more or less affected by weathering, and the closing of the wound by natural processes is made more difficult. In the

case of large wounds the callus continues to increase and overlap more and more the old exposed wood, but its activity diminishes from year to year. As soon as the callus ring has begun to form, its outer cells undergo the cork-transformation, and thus the delicate cambium cells are soon covered with a protective bark similar to the normal bark of the stem, and, as this bark increases in thickness, it exerts an increasing pressure on the cambium cells beneath, which sufficiently explains why the, at first, luxuriant production of new cambium cells gradually diminishes. The function of the cambium in the normal trunk, you will recollect, is to produce new wood cells on its inner surface and new bast cells on its outer surface, and the same function is retained when it grows into a callus. We find, therefore, that in the callus itself new layers of wood are formed and overlap the old wood, and, if the process goes on long enough, it happens that the old wood is entirely covered by new layers of wood and a cortex somewhat similar to that of the uninjured trunk.

So far, we have supposed that we were dealing with a wound made by cutting directly across a branch. What is true in this case is essentially true of other wounds, and we cannot now stop to consider in detail the innumerable modifications depending on the form of the wound. As a matter of fact it more frequently happens, as when branches are broken by the wind or snow or by external violence of any kind, that the wound is irregular or splintered, and in such cases the cortex is often torn away from the branch below the wound and the cambium is crushed or injured. Consequently the healing process is very much hindered. Again, when trees grow thickly together, or for other reasons, the lower branches often die and break off at a certain distance from the main trunk. In such cases the stumps of the branches very often die and remain projecting as dead plugs or pegs. This is in part owing to the disturbed nutrition of the stumps, a subject too complicated to be described here. The fact is evident, however, that such pegs do not heal over but rot away, and must be considered open wounds.

Up to this point I have dwelt upon the nature of wounds and the healing process adopted by nature, and you will now ask, Why are all these elaborate changes necessary? What is the harm if a wound does not heal over? As a rule it is safe to say that the provisions of nature are always adapted to some special end, and

we should naturally infer that, since nature always does her best to heal wounds, it must be because the plant would otherwise suffer. Experience certainly shows that open wounds are dangerous in plants as they are in animals, although I would not go so far as to say that they are inevitably dangerous. There is no doubt, however, that in most cases they are dangerous. Every surgeon recognizes the dangers attending open wounds in animals, and, before the days of the antiseptic treatment, the dangerous and often fatal results of operations were due in many cases to the entrance of germs from the air into the system through open wounds. In the same way wounds of plants are dangerous, although a fatal result may not be reached before the expiration of several years. Naturally the intact epidermis of the younger parts of plants and the corky bark of the older branches and trunks prevent the access of the spores and mycelium of fungus parasites to the more sensitive tissues beneath. Where the bark has been removed, they may and often do work their way into the interior, and cause, at first, a local and, later on, a general decay of the trunk. The fungi which are the agents of destruction in such cases are not the rots, smuts, or mildews, which affect rather herbaceous plants than trees, but fungi of the toadstool family. Those of you who have watched the larger wounds of trees must have often seen clusters of toadstools of different kinds growing out of the wounds. They are most frequently seen in the warmer months, but there are a few species which are to be found even in the mild weeks which sometimes come in midwinter. Besides the fleshy toadstools there are many species of punk-fungi, belonging technically to the same family as the toadstools, which infest wounds, and they are so tough and hard that they can be found throughout the year.

The question might arise whether these toadstools and punk-fungi grow in wounds because the exposed wood is already dead and therefore furnishes food for the fungi, or whether, on the other hand, the death and decay of the wood are brought about by the presence of the fungi. In a certain sense both these questions may be answered in the affirmative. When the exposed wood dies, it furnishes a soil in which the spores of the toadstools and punk-fungi can germinate and grow, and it is also true that when they have once begun to grow, many species are able to make their way downward and upward into the healthy parts of the

branches and cause them to rot. It is a very common experience that the rotting which began in a wound gradually extends to the main trunk, so that although the bark, except where the wound exists, appears to be perfectly sound, on cutting the tree down, the whole trunk is found to be rotten or hollow.

What happens, except in very small wounds which heal at once, is as follows: The porous wood takes up moisture from the air in greater or less amount according to the season, but in almost all cases enough to cause the outer exposed part to decay in the course of from a few weeks to a few months. Not only is water absorbed from rains and mists but dust and other organic substances gradually collect on the surface and there is thus formed a sort of soil, in a thin layer to be sure, but enough to support, at first, the growth of bacteria, which help on the decay of the solid parts, and, later, offer a favorable field for the germination of the spores of toadstools. A very small amount of damp soil is sufficient to start the growth of these toadstool-fungi. Their spores, when they germinate, give out a series of branching threads, the mycelium. The threads gain strength as they grow, and, in a good many species, they at length acquire the power of dissolving the walls of the sound plant cells, even if they do not in the beginning possess this power. Aided by the increased moisture, which is favored by the presence of a damp, earthy layer on the surface of the wound, the destructive threads make their way slowly along the interior of the trunk, the process of destruction causing an increase of moisture and sliminess, which only makes the ultimate destruction of the hitherto sound wood the more certain. While all this is going on within the trunk there may be no definite indication on the outside of the harm done. The toadstools, as we call them, are the fructification of the fungi, of which the threads are the organs of vegetation, and it is not until after the latter have attained a somewhat advanced development that the toadstools themselves appear on the surface. Their appearance almost invariably indicates not that trouble may be expected, but that the disease has already made considerable progress.

The toadstools and punk-fungi, of which I have spoken, are usually not limited in their growth to any one species of tree, but may grow on a good many different kinds. There are some species, however, which attack only particular kinds of trees, and among the number are forms which are more virulent and rapid in their

action, especially those that attack the roots when they are wounded. It is not my purpose, nor would the limited time allow me, to give an account of these special parasites. Enough, however, has been said to demonstrate the danger of open wounds and the necessity of aiding Nature in her efforts to heal them. In the natural course of events many wounds must occur from the violent action of the wind and snow, and we should do what we can to remedy them. But it is perhaps more to the purpose that, recognizing the danger, we should use our influence to prevent the avoidable and wilful maiming of our shade trees by careless and ignorant people.

As far as the treatment of wounds is concerned, our object should be to cover the exposed surfaces, so that moisture, which would cause them to rot, may be excluded, and that the spores of fungus parasites may not find an entrance. A useful hint as to to what should be done is given us by nature herself. In some respects the coniferous trees suffer less from wounds than other trees. The reason is that in the wood of conifers there are canals or passages which contain resinous substances, and when the wood of such trees is wounded they exude and form a close varnish of resin over the exposed surfaces, which are thus kept dry and protected from weathering. As a result, the wood is less likely to rot than in the case of other trees whose wood contains no resin. In trees of the latter description, when wounds occur by accident or design, the indication, to use a medical expression, is to coat the cut surface with tar or some similar substance. There are several practical considerations to be borne in mind in applying the tar. If the wounded surface is rough and splintered, it should in the first place be made as smooth as possible, and where branches have been broken off a few inches from the axis from which they sprung, they should be sawn off close down to the main axis.

When branches are to be pruned, it is of importance that it should be done at the right season. It might be inferred from what was said previously that the summer months would be the best time, because the cambium is then active and the callus begins to form at once. There are, however, other points to be considered. Unless the branch is small, it will take several years for the callus to cover the whole wound, and, meanwhile, the exposed wood may rot unless well coated with tar. The important

question then is not so much to select the season when the cambium is most active as that when the coating can be most securely applied. During the warmer months the cut surface is kept moist because the cells are then more succulent than in late autumn and early winter, and it is not always easy to apply the tar closely under such circumstances. The pruning of deciduous trees should, when possible, be performed in the late autumn or even in early winter, rather than in summer, since the tar then adheres better. Another important point is to saw off the branches carefully, so that the cortex may not be torn away from the wood, leaving the latter projecting. This is always a more or less difficult matter, because unless the cut is made in a horizontal direction, which is seldom the case, the weight of the branch itself, during the process of sawing, tends to tear away the cortex on the lower side of the cut. Where it is possible, the branch should be propped up during the cutting, and special care should be taken that there is no tearing of the cortex on the lower side. Even under favorable conditions, a pocket is apt to be formed on the lower side of the wound, and the application of tar at this point should be made with great care, since wounds are almost always vertical or oblique rather than horizontal, and rain and moisture naturally collect at the lowest point of the wound, just where the pocket is unfortunately made in cutting. It is evident that too great care cannot be taken in covering this part thoroughly.

After this sketch of the nature of wounds and of the danger with which the life of trees is threatened, I trust that what I have said in regard to treatment will appear rational and practical. I must not, however, close my remarks on this subject without uttering an emphatic protest against the way in which the shade trees of our cities and towns are treated. The responsibility rests not only with those who, perhaps unintentionally and ignorantly, are directly guilty of what an enlightened public opinion should regard as vandalism; but it rests in part on ourselves, if we do not in all possible ways seek to give to the public, information, and attempt by all legal means to secure the enforcement of such regulations as shall assure proper protection for our trees. As it is, the care of the trees in our public grounds, parks, and streets is too often placed in the hands of those who are ignorant of the principles of vegetable physiology, and their efforts to prune and cut down trees are guided only by what seems to them temporary

convenience, or by what commends itself to their not infrequently perverted sense of the beautiful. When the whim seizes them and they wish to get rid of a stately tree, it is only necessary for them to say that it is rotten, and dangerous because likely to fall. Many times I have seen trees whose shade could ill be spared, cut down because their trunks were rotten, when examination after they were felled, showed that they were sound and would have lasted many years. It ought to be considered a crime to cut down a handsome tree—certainly in public grounds—unless compelled by absolute necessity. When it is thought necessary for the public safety to destroy animals supposed to be suffering from contagious diseases, there is, at least, a consultation, and the opinion of experts is asked. I hope that the time will come when it will not be allowed to cut down trees which are public property, except on the advice of those whose training entitles them to be called experts.

If one is amazed sometimes at the abuses of trees on the part of those who are their authorized guardians, it must be admitted that the poor condition of our trees is principally due to the recklessness of the public. The streets of Boston and the suburban towns are notoriously narrow, as are also the sidewalks, and in consequence the trees are more subject to injury than in regions where the streets are wider. In most of our streets the trees are very near the edge of the sidewalk, if they do not project into the street itself. Those on the corners of the streets are almost sure to be grazed by passing vehicles, and as wagon after wagon passes along, the grinding process is kept up until the wood is exposed. It is perhaps fortunate that such trees are short-lived, for they become very unsightly, and when they die, the curbstone can be replaced as often as is necessary.

Walk along any of our streets where the trees are placed on the edge of the sidewalk and notice the effects due to our general negligence. In some instances you will find that the house-owners have placed guards around the trunks, and the trees are symmetrical and have attained a good size. But in most cases, they have been left to take care of themselves. Bright and early the milkman comes along and jumps off with his can, leaving his horse to make a scanty breakfast by gnawing the bark of the nearest tree. Later on come the butcher and the grocer, whose horses lunch upon what was left by their predecessor, inflicting an amount of

damage to the tree limited only by the length of time which their owners are pleased to spend in conversation with the girls in the kitchen. Last of all comes, perhaps, the doctor, whose visits, if they are not frequent, are proportionally long. He, at least, ought to know that trees cannot be wounded with impunity. No wonder that the bark is not only soon removed and the wood exposed, but since the horse is an animal which prefers the softer bark to the harder wood, the fresh borders of the wound are repeatedly attacked until deformities of enormous size are produced, and apart from the danger of fungus growths, the nutrition of the tree is seriously deranged. A visit to Oxford Street, Cambridge, where on one side of the street the trees have not been protected, and wounds more than two feet long have been made by horses, will show that I am not exaggerating. If I mention this particular street, it is because I have to pass through it every day. Other equally bad instances might be named.

Surely there can be no excuse for such senseless and wholesale violence, especially since the remedy is so simple and so inexpensive. The trees planted along the streets are not the private property of the house-owners, with which they can do what they please. The public has the right to demand that the trees be properly guarded and protected, since otherwise it is not possible to secure the requisite shade in summer. But apart from the public rights in the matter, it is for private advantage as well that our trees should be kept in good condition, since the attractiveness of any street as a place of residence depends largely upon the beauty of the trees. Not a few of our New England towns owe their prosperity as summer resorts to the arching elms and well-rounded maples, whose loss no money could replace. It would be both just and wise for every thickly settled town and village to have laws compelling house-owners to place proper and sufficient guards round the trunks of trees growing by the roadsides, or if it be considered inexpedient to place this apparently slight burden on private individuals, it is at least the duty of municipal and town governments to provide guards and railings at the public expense. It is strange that there should be any person who lives in his own house, who would not willingly do all he can to beautify it by keeping the trees near it in the best condition. But, unfortunately, there are many such persons. Where houses are rented, the tenant is naturally little inclined to any expenditure

however small, for the benefit of the landlord, and the latter is less inclined to spend money where he does not see that he is getting a direct benefit for himself. To let the trees become shabby or go to utter destruction is a short-sighted policy for any individual or community.

In short, an effort should be made to secure legislation which shall make compulsory the placing of guards around trees in exposed places. Furthermore, the care of the trees in public grounds should be entrusted only to persons specially trained for the purpose. An engineer may be admirably qualified to construct good roads, but it does not, therefore, follow that he knows how to manage trees, and even those who have attained great skill in the cultivation of flowers and the arrangement of flower-beds are not necessarily the best persons to look after trees. The desirable legislation can probably be secured just as soon as the public understand why it is desirable and necessary. It is all very well to talk about the protection of forests and the formation of national parks in distant states. But we have our own forests, which are the trees in our streets and public grounds, and before turning our eyes in other directions we had better see what is needed at home. It devolves upon you, ladies and gentlemen, so to educate the public in this matter that they shall soon learn to recognize that a tree is something to be respected and protected. It is not enough that we erect commemorative tablets before a few historical trees, and take strangers to see, not so much the trees as the tablets. Historical association may lend an additional interest, but every well-developed tree has that within itself which should command our respect and admiration,—its beauty and its utility.

The lecture was illustrated by views, thrown upon a screen, of wounds caused by the gnawing of horses; specimens of skilful, and of careless pruning; stumps of broken branches, etc., showing the progress at different stages of Nature's efforts to heal them. Several kinds of fungi which are found upon and in such wounds were also shown, with the method of their growth and appearance at different stages of development. This exhibition included front, side, and sectional views, which, with Professor Farlow's explanations, afforded a very clear and complete idea of the subject.

Discussion.

Rev. Calvin Terry said that he appreciated the subject of this lecture. From what the speaker had told us the logical conclusion would appear to be that special legislation is necessary. There should be a special Board of Commissioners in each town as well as city, who should have entire control — with due regard to the rights and wishes of the abutters — of all ornamental trees and shrubbery in the streets and public grounds. Such officers should be experts, or persons who are well fitted by education and experience acceptably to discharge the duties of that office. At present these matters are mostly left to the discretion and mercy of the knights of the pick and shovel, who know little or nothing of the needs of such plants and are more apt to damage than to protect them. He spoke from sad experience.—he could not forget his feelings when he reached home on one occasion and found some of his trees seriously damaged and permanently disfigured.

O. B. Hadwen said that he had been delighted with the lecture, as he appreciated highly the importance of protecting and taking good care of trees. He had been one of the Park Commissioners of Worcester since 1867, and with his colleagues had had many encounters with the Commissioners of Streets, whose workmen seem determined to injure trees which impede their progress in setting curbstones. However, they have improved somewhat, as there is less damage done now than in former times. Referring to injuries from other causes, he spoke of a fine tree that was considerably burned on one side during a conflagration in 1842. The tree was about two feet in diameter and in vigorous growth at that time, and directly began the work of repair. This has been continued ever since and the wound is nearly closed over although there is a cavity behind the new growth. It bids fair to live many years, and he thought it a rare instance of such restoration. The speaker recommended that when private citizens set trees in front of their premises, they put them within their own lines, in order to retain control of them, and avoid a great deal of annoyance from many sources. Trees add largely to the beauty of our villages as well as cities, and the people take pride in such adornments, but they need protection and should have it.

Leverett M. Chase had been much pleased with the lecture. He felt a deep interest in the subject and believed there was need of some action to educate the people up to a love for trees that will ensure their protection. In foreign countries he had seen with delight the trees which adorn the streets; not only ornamental varieties, but rows of fruit trees, the fruit of which the owners can gather, their rights being protected and respected, even by mischievous boys who take delight in stealing fruit. Often certain trees are marked to show that the public are welcome to their fruit. The protection of owners' rights is an encouragement to the extension of such planting upon the streets. As a contrast to this system, he cited a case in this city, where a man bought an old barn, for fifteen dollars, and moved it three-fourths of a mile, over streets lined with old shade trees. Of these, thirty-one were mutilated more or less; in one case, a branch about eight inches in diameter was cut off, disfiguring that tree greatly and permanently. The aggregate damage on that route amounted to very many times the value of the building, and all might have been prevented had the authorities in that case received a right education, and possessed a true appreciation of all the circumstances.

The selection of trees for street planting is also very important. Mr. Chase said his favorite was the maple; and among others, he liked the American elm and birches. He would have all pruning of trees done by trained men. Ignorance of proper times and methods of doing this work causes the destruction of many fine trees and shrubs. By pruning fruit trees without due regard to the time of year and also to the balance between roots and foliage —the latter serving as both lungs and stomachs— not only the quality and quantity of fruit has often been diminished, but many valuable trees have been destroyed. We, as a people, are far behind the ancients in love and reverence for trees. Xerxes placed golden ornaments upon a fine plane tree, and detailed a guard to protect it while his army was passing by, in order to secure its preservation as an ornament, and its grateful shade for that place in coming time. Even in the old mythology we often read that trees and groves were held sacred, and the gods are represented as punishing those who wantonly destroyed, and rewarding those who strove to save or protect, these valued productions of Nature. The cases of Erisichthon and Rhœcus were cited as illustrations which perhaps were not wholly embodiments of mere

fancy. The speaker believed that we have need of ornamental trees to promote the best moral and æsthetic development of the people.

Mr. Hadwen, in answer to an inquiry, stated that the Worcester Park Commission consists of five members, each holding his office five years. One member is elected each year, and all serve without pay. Some members have been re-elected continuously for a long time, while others have served but one or two terms. As a rule they take a strong interest in their duties, which include the planting and care of trees in streets, and the control and direction in the management of the parks of the city, which are now ten in number. They must be consulted if a building is to be moved on any street; and if any action of the street commissioners interferes with their department, the former must respect the suggestions of the park commissioners. He said that Ex-Governor Lincoln had a high regard for the trees in the streets, and on one occasion, when he saw a stranger about to tie his horse to a tree, he remonstrated. The stranger said his business was urgent and that he had no time to find different accommodations, whereupon Mr. Lincoln proposed to hold the horse while its owner was engaged, and he did so, thus preventing the injury to the tree, which had been threatened.

William C. Strong thought it was apparent that we ought all to labor to get Park Commissions in our own towns. He then asked the lecturer about washes for exposed places where branches had been cut off, or accidental wounds made upon the stem of a tree. He had used a compound of wax and alcohol, and inquired if alcohol was injurious to the trees.

Professor Farlow said that a mixture of grafting wax and alcohol, so proportioned that upon its application the wax would harden at once, he should consider good, and that the alcohol in such a compound could not of itself be injurious. He recommended pine tar, although some other preparations might serve the purpose as well.

Robert Manning considered tar poisonous to trees. His father used a mixture of tar and red ochre, but his observation was that it injured the trees — mostly pear — to which it was applied. For his own use he preferred a paint of linseed oil, which he believed harmless and quite as serviceable as any other yet named. Yellow ochre had proved very effectual in preserving the wood, but he liked to have the paint as near the color of the bark as possible, and used lead as a basis.

Mr. Strong did not approve of paint or shellac, and believed tar to be injurious. He had used grafting wax dissolved in alcohol, with good effect, but would like to find a better compound for the purpose.

Jacob W. Manning said that in training young trees for planting in streets he would advise pruning the lower branches away to ten or twelve feet from the ground, rather than allow, as we sometimes see in older trees, large branches to start out from five to seven feet from the ground, which eventually have to be cut away, not only destroying all beauty of form, but leaving a wound that may never be healed. He thought the American elm one of the very best trees we have for street planting.

Mr. Hadwen was called upon to answer the question: What is the best time to prune apple trees? In reply he said playfully "When your saw is sharp." For young trees any time that they appear to need it is suitable; but for fruit-bearing trees he should prefer to do it in April or May, when the branches are more readily bent without breaking. The older the trees, the more surely they should not be pruned in autumn. When pruning in May great care must be taken not to start the bark from the wood, and, as one safeguard in this respect, it is always better to cut the under side of a branch before cutting the upper side. To the question: "Will not spring pruning damage buds?" he replied that if the workmen are careful no harm need be done.

Mr. Chase said he thought the lecture was one of the most interesting and valuable we have heard this season and moved a vote of thanks to Professor Farlow, which was passed unanimously.

Mr. Hadwen announced that on the next Saturday, Charles L. Allen, of Floral Park, N. Y., would read a paper upon the "Scientific Education of Gardeners."

BUSINESS MEETING.

SATURDAY, March 14, 1891.

An adjourned meeting of the Society was holden at eleven o'clock, the President, WILLIAM H. SPOONER, in the chair.

No business being brought before the meeting it

Adjourned to Saturday, March 21.

MEETING FOR DISCUSSION.

The Scientific Education of Gardeners.

By Charles Linnæus Allen, Floral Park, N. Y.

Education is the development of the human faculties and the training of them in such a manner that all the forces of the intellect act in harmony in whatever direction reason or taste dictates. Education, when united with industry and perseverance, enables a man to reach the highest social, political, professional, or business position.

All that there is or can be gained in life is proportionate to the development and application of our natural gifts. As a rule, intelligence, the fruit of education, combined with industry, invariably wins; while ignorance as surely fails in solving the great problem of life.—how to secure success. This principle is universal in its application. It applies to all men and to all conditions of life. It does not affect the principle that some men of rare intelligence do not succeed in business, or that some quite illiterate or ignorant men are prosperous. There are many causes of failure other than educational, but there is one fact which cannot be disputed, namely, that no business ever prospered unless talent, trained or untrained, stood at the helm. The occasional success of a man in business who rarely reads and never writes anything more than sometimes to sign his name, shows us a man of natural talent who would have been a power for good in the land had his mind been properly educated or disciplined. The well educated man is, relatively, a great many men, for, besides his own natural resources, he has the experiences and observations of other men to guide him. It is only the liberal-minded man who will profit by the experience of others; he learns both by their successes and failures.

The greater our natural abilities, the more important it is that they should be properly trained. Talent should be wisely directed. Untrained talent is a dangerous element; it is like a spirited but unbroken horse, quite as liable to go wrong as right. Confucius said, "Learning without thought is labor lost. Thought without learning is perilous." This truism frequently confronts us in our business relations. That all men should be educated in order to develop their full capabilities, does not admit of a doubt, the only difference in opinion being as to the degree.

The subject for discussion today is "The Scientific Education of Gardeners." The term "scientific" seems to stagger many men, particularly our practical gardeners, who, as a class, are men of great natural shrewdness and superior ability, close observers, and men of keen perception, with an innate love of the beautiful in form and color — men whose noble instincts make them liberal to a fault. Such men are quite apt to think there is a conflict between science and practice. This is a great mistake. They are simply cause and effect. The general impression appears to be that science is a degree in the scale of knowledge that is only conferred by some institution of learning; that scientific men dwell in a peculiar atmosphere and possess some hidden facts not easily attained. Let us refer to Webster for a true definition of the word:

"1. Knowledge; penetrating and comprehensive information; skill; experience, and the like.

"2. The comprehension and understanding of truth, or facts; investigation of truth for its own sake; pursuit of pure knowledge.

"3. Truth ascertained; that which is known."

A simple definition of the word "science" would be, exact fact, which is alike applicable to industry, general intelligence, order, manhood, and correct business habits. The only difference between a scientific and any other fact is, that the one is exact, methodical, punctual, and critical; the other not. This difference is seen also between two gardeners having the same general outfit as to appliances, and tools or implements; the one has everything orderly and in its place; the other, everything in a heap.

With these simple definitions of science, let us make a few applications in the order named, first stating that when a young man chooses an occupation for life, he should have three distinct objects in view: First, to establish himself in business that will with industry and economy provide him with a home and a competence in old age; second, to be a leader in whatever profession or business he may choose, honored and respected by all men; and lastly, to pursue some line of thought or study allied to his business, the influence of which will make old age beautiful through the pleasant memories of a life well spent.

Success is, or should be, the warp and woof of every young man's ambition. He naturally wants to tread the path that is the

shortest and most direct to wealth, honor, and distinction. There is not a young man of fair intelligence and with an ambition that knows no failure, who will not be ten times more likely to succeed in the horticultural field than in any other walk in life. He will, moreover, satisfy all the desires of his ambition. It is to be supposed that he has no capital at the start other than strength and determination, and these are all that will be required if he is scientific in his methods. If wise he will consider well every step; he will estimate the chances of success and the possibilities of failure. Because the life of the gardener is one of toil, he should not be discouraged and get enamored with city life. The excitement that evolves from the whirl of active business, and the honors that are shown those who attain high distinction in their profession, are truly fascinating, but we would caution every young man against indulging in hopes that so rarely ripen to fruition.

If a gardener wishes to reach distinction, he must become scientific in everything that relates to his business. His industry must be proverbial; he must never be in haste, but never idle. To accomplish the most in a given space of time with the least possible expenditure of labor is the science of industry. His intelligence should know no limit. There is no other field so broad or so beautifully diversified as the garden. A thorough knowledge of plants and their requirements is the key to success. The old truism that "knowledge is power" is more plainly exemplified in the life of the gardener than in any other calling. No man who commences to build up a business career without capital, will be so greatly benefited by a complete knowledge of his work as he. A gardener who has a thorough knowledge of every plant he handles, has an education that his employer covets; it brings them together in harmony; they converse freely over a favorite plant upon terms of human equality. The more the gardener knows, if he is willing to impart it, the more important he is to the position he fills, and the greater will be his chances for advancement. Many gardeners get a very wrong impression when they enter upon a new situation. They feel as though interests instead of being mutual are antagonistic, that the conditions are as master and servant, while such a feeling never enters the employer's mind,—that is if he is a man and has a garden to gratify a love for the beautiful—and I pity the gardener who has charge of a place where flowers are only grown

as external evidences of wealth. Flowers should never bloom, or fruit ripen, for such men, for they have not the slightest appreciation of the gardener's work and worth, or the respect they owe their fellow man. The gardener's home is with the man who has a bond of sympathy in his heart, rather than sympathy only with his own wealth. Many gardeners get to feel that the owner of a place has no right to do as he likes with his own,—that if he wants a flower or fruit for a friend it must be taken only with the gardener's consent. We know this feeling is common, but we do not think it is by any means general.

Every true lover of flowers, and the gardener more than all others, knows that they who see a flower only with their eyes see but little of its real beauty. It must be seen through the understanding to be appreciated. It is the life in the plant that is truly beautiful. Each and every plant is a teacher, and they who understand "plant talk," can impart to others information far more fascinating than the work of the poet's imagination. Let the gardener make it a rule to show his employer, every time he enters the conservatory, some of the hidden beauties of the plants,—some fact in relation to the phenomena of plant life; how it feels and understands; let him point out those wondrous facts with which his mind is stored, as though he were a brother or a friend, and there will soon be established a mutual and endearing friendship. This is the scientific way of managing an employer and it is a sure stepping-stone to success. There are but few gardeners filling responsible positions in our country, who, if they will unite with this disposition habits of industry, integrity, and good nature, will not find in their employers never failing friends,—friends who will gladly assist them, if need be, in establishing a business of their own.

The opposite of this is too often the case. We have known instances where conservatories have been sold and places given up because the owner and the gardener could not work together in harmony. Now we do not for a moment think the gardener intends a wrong,—far from it: it is simply a mistaken idea of his rights and duties and if it were not for this, there would be many more employers than there are now.

There is a science in manhood and honor with which the gardener should become familiar. As facts are scientific, we wish to state a few very plain ones that every one can apply to himself or

reject, according to the facts in the case. It is the almost universal practice in some countries, and sadly too common in this, for gardeners,—and they are not a particle different from other employés, to expect, yes, to demand, a commission on all purchases made for their employers. This method of getting extra compensation from an employer, without his knowledge, is a sad injury to one of the most beautiful and honorable professions that man ever followed—that of the gardener—not only in the breaking down of manhood and common honesty, which entails the loss of character, but in creating a lack of confidence on the part of the employer which will not permit him to make the advancement in wages and position that he would otherwise be glad to make. Some of the English seedsmen have repeatedly told me that most of the head gardeners in that country bought, annually, fifty times more seeds, in value, than they could possibly use, simply to get the commission. Our observation shows that this practice is on the increase in this country. We have been asked for the commission frequently, the parties claiming it as a right, saying "all seedsmen allow it." But all do not. No man worthy the name of seedsman will compound a fraud of this kind and no man worthy of the name of gardener would do otherwise than reject an offer which would disgrace himself and cast a blight on the whole fraternity. We know many gardeners who feel keenly the disgrace heaped upon them by their dishonorable associates. A gentleman who owns a large place recently told me that he should be glad to give me his order but he dared not, for if he did his garden would be ruined for the season. He knew why seeds were bought elsewhere and said it was cheapest to keep quiet and submit to the imposition, and further, that but for this he would largely extend his area of glass,—in fact would be glad to start a commercial place and give his gardener the lion's share of the profit, but he could not trust a man who would practice such little irregularities. Now, I do not think a large proportion of our gardeners are dishonest in this respect, but the few work great injury to the whole. It should not be so, but it is, and the young gardener looking for success in his profession should reject with righteous indignation all emoluments of this character, which, I am sorry to say, will be freely tendered him.

But to return to the question of practical education. Where can it be obtained? Taking it for granted that a young man has

at the start a fair rudimentary education, the garden is the school to attend, where every plant, animal, and insect is a teacher. These must all be learned; they are the elements of that education which will lead to distinction. As science is the exact knowledge of things, here are the objects to be learned and loved. These terms should be reversed in the order given, because if the object is not loved it can never be thoroughly learned. And we would say here that if a young man does not love the garden and all therein, he should enter some other profession, for there is no more pitiable object in life than a man following a profession that he does not enjoy.

Systematic botany need not necessarily enter largely into the gardener's education, but though he can do without it he will be far more proficient with it. A genuine love for plants will create in him a desire for a knowledge of their systematic order and arrangement; he will then seek that information as a pleasant pastime, rather than as a branch of his education. The phenomena of plant life are far more important to understand in order to know the plant's necessities; why and how plants grow, how they feed and what they feed upon; the cause of failure as well as success. The gardener is the only man who knows how to develop a plant to its greatest perfection; how to improve upon old types and create new ones. He does not want to learn from the professor; on the contrary, he should compel the professor to learn from him. As a rule, professors are not scientists; they are simply the distributors of the facts termed "scientific," that have been obtained by the observations and experiments of other men. The scientific man is he who has discovered some fact not previously known, and can reduce it to practice. And among our systematic, intelligent gardeners more of such men will be found than in any other walk in life. Their operations are so varied that they come in contact with more obstacles that are to be overcome, than any other class of men. They are compelled from the very nature of their business to know more. The mechanic of today learns but a small part of one branch of his business, and this is being constantly repeated without the slightest variation. He is a part of a machine. The gardener must, in a great measure, be governed by the elements, which are very capricious; he must perfectly understand all the conditions of soil and climate and be governed accordingly. Impossibilities are not unfrequently required at his

hands and should he mention the elements as opposing forces, it would not always be accepted as a valid excuse for the failure of a crop.

While gardeners, through methods strictly scientific, have succeeded in producing more novel forms or types in vegetable, fruit, or flower than all other men, they rarely profit from it financially as well as they ought, because they are not systematic in business methods. They do not apply their gifts to their own profit; they let other men reap where they have sown.

Let us state a few facts in support of this assertion. Nearly every prominent seedsman in our country annually sends out some "novelty" in plant, fruit, vegetable, or flower. The seeds or plants of these are sold at no small profit. From whence does he obtain these valuable acquisitions? Invariably from the gardener, whose keen discrimination has detected some little variation in form, color, or marking of a flower; either a sport, a chance seedling, or perhaps the result of systematic cross-fertilization. He may have discovered a plant remarkable for its vigor, and with flowers larger, of more substance, and of a deeper color, than the type. He selects the seeds from these and, by careful, systematic selection, after years of patient, pleasant industry, establishes a type of superior merit. And what is the result? He shows the fruits of his industry at an exhibition and is justly proud of the certificate or medal he has earned. His favorite seedsman gets the stock for a mere song and creates a sensation by the introduction of a "novelty" and makes a good profit, which the gardener should share but rarely does. We have known very many instances of this kind; in fact have profited by them, and we can truly say that we do not know of an instance (and we have followed seed growing for many years) where a seedsman ever originated any one of the new varieties of vegetables or flowers which he has disseminated. It is the gardener, or agriculturist, to whom we are indebted for all that is valuable in the way of new varieties.

The same is true of scientific knowledge in its relation to plant culture, growth, or development. We are indebted to the gardener for all the facts pertaining to these subjects, which the professional scientists are teaching. Practical knowledge can be gained from no other source. If a man wants the real knowledge of plants, he must go to the garden and learn it of the plant. He

must be a gardener. It matters not whether he is to teach the art or practise it; the garden is the school and Nature the head teacher. However much the science may be disseminated afterwards, it is born in the garden and cradled by the gardener.

A man may be proficient in systematic botany; his herbarium may be complete; and yet he may not truly know orchids or onions. There is a great difference between *knowing a thing* and *knowing about it*. To *know* is to be educated; to *do* is to be scientific. A man is not necessarily a musician because he can render perfectly one of Beethoven's symphonies. He may be only a performer or imitator. A musician is he who has assisted in perfecting the modulation of sound. So too, a man is not a gardener who simply talks about the garden and describes the plants. He may know their names and origin without knowing *them*. He is not a scientific gardener who can repeat every word of some scientific treatise on gardening. The scientific gardener is the one who, through his own observation and industry, has gained some facts in regard to plants and their culture, or developed some forms, not previously known. He is a man who can make a garden and have in it all that is desired in the greatest perfection. Such gardeners teach our professors.

If a man should call upon one of the professors of botany or horticulture at Harvard, the fountain head of education, and make some inquiry regarding trees, he would soon be filled to overflowing with the contents of their text-books and he would very likely exclaim, "I do not want the tree in the abstract; I want it on the lawn, in the orchard, or by the roadside." The professor would then say, "if trees are what you want, go to the Arnold Arboretum and see Dawson. He knows them all; they sing for him and talk to him in their way. He knows their language because he is in sympathy with them. Every fibre of a tree is a musical chord that is in harmony with his nature. A seemingly lifeless branch will bud for him when it would not live for another." If a man wanted roses, he would be directed to Moore of Concord, or Wood of Natick. If chrysanthemums, he would be directed to Dr. Walcott. If orchids were desired, he would be told to visit Robinson or Allan. If he wanted lessons in landscape pictures combined with everything else relating to horticulture, he would be advised to take the first train for Wellesley and have a chat with Harris, who knows vegetables, fruits, flowers, as well as trees

of all kinds, and can make of them pictures with which, for real beauty, nothing in the way of art can compare. He knows all about them while we only know what he has done.

So much to show that the professor is dependent upon the gardener for scientific truths, and the gardener is entirely independent of the professor.

The gardener should be educated not only up to the times but far ahead. The plants of forty years ago have no place in the garden of today; while those of a hundred years ago may have, as novelties. Change, the universal law of Nature, is the order of the day. This is not due to fickle caprice, but is necessary to satisfy the increasing demand for the beautiful,—a demand that is imperative and exacting. Not that we tire of old forms or colors in the flowers, or the delicious qualities of our vegetables and fruits; but the spirit of progress which marks this era is reaching far and wide for the perfection in development that knows no limit. This spirit should stimulate the gardener to more constant, systematic, and noble effort in his profession. It is to him and to him alone that we are indebted for the garden of today in contrast to that of fifty years ago. In this country, flowers were then regarded as luxuries; today they are necessities. The desire for a good garden is now so nearly universal that the exception only proves the rule; and there can be no gardens without gardeners. Some of the best—at least the most enthusiastic—are amateurs, and to them we are largely indebted not only for the improvement in floral forms but for the development of taste that makes gardening a profitable profession. Though amateurs, many of them are wealthy, but still they are gardeners if they love and work in the garden, and if there is one influence more powerful than another in removing that distinction in society which wealth creates, it is a love for and a common interest in the beautiful. This love united with other elements of character, will bring into harmony all classes of men having congenial tastes, and cause them to become warm and congenial friends. These signs of human equality rarely appear in any other walk in life. There is no bond of affection between a merchant and his clerks, manufacturers and their employés, such as is frequently seen between the owner of the garden and the toiler in it.

The gardener, whether private or commercial, should always be on the alert for something new. His success will be proportioned

to his development of new and rare forms. He who introduces a new rose, if it has merits not already possessed by others, and if it be the result of the labor of his own head and hands, has established an enviable reputation which is quite as important, in a business way, as the direct profit that will accrue from its introduction. There never was a time when wealth contributed so liberally to taste as the present. Any new floral form, of merit, is eagerly sought and liberally paid for; it matters not whether it be superior to existing forms — if it has distinctive characteristics it will find a place in every garden and add to the fame of the originator.

But the old should not be neglected for the new. The perpetuation of old varieties is quite as important as the development of the new ones and, perhaps, more so. All depends upon the skill of the gardener in getting from the plant all that it is capable of producing. There is, oftentimes, more difference between a variety perfectly developed and the same neglected, than between an old and a new, though similar, variety. The scientific gardener will make the old appear as new because of perfect culture, while the unscientific gardener will make the new appear old from carelessness and neglect.

System, which carries with it order and neatness, is a good working capital for any gardener. A neat garden is almost invariably a good garden, and the manager of such an one is sure to be successful. The plants he grows will bring twice as much in the market as those from the sloven's hand. All that makes a plant valuable is its beauty, and beauty is never associated with filth. I would, therefore, urge every gardener, amateur or professional, private or commercial, to encourage and stimulate a love for the beautiful; it is an antidote for all the asperities of life; it softens the hours of labor and sweetens the acerbities of our natures. A study of the beautiful, whether in the plant, the tree, or the flower; whether in the conservatory or the vegetable garden; in field or wood; in fact wherever found, will have a tendency to elevate and strengthen and refine character and materially assist in promoting happiness. The gardener, more than any other man, is a child of Nature, whose gifts, united with his industry, his experience and observation, will make old age beautiful and pleasant. The love of the beautiful never wearies nor grows old; on the contrary it increases with our years.

When the active duties of life are over, the gardener has a rich fund of enjoyment and constant companionship in the plants he loves.

I would say in conclusion that financial success in life is within the reach of every gardener who will truly and nobly seek it. There is room and opportunity for all. There is abundance of work for those who are anxious to find it. Our country is broad and rich and made richer every day by those who are willing to work. A small business can be started with but little capital other than energy, industry, and intelligence, united with sound morality, that will rapidly elevate a man to a comfortable and honorable position. The lower walks of horticulture may be full to overflowing, but in the language of your great statesman, "There is plenty of room up here." In this country, where men are measured by their worth, and not by the accident of birth, distinction only comes to those who work for it, and there are no men more likely to reach it, than well-informed, honest, and industrious gardeners.

Discussion.

F. L. Temple asked what ought to be done to stimulate the production of new varieties of hardy trees and shrubs. He thought the efforts to improve our stock of plants have been for a long time directed to bench or bedding plants almost exclusively, and he felt that there is need of a change to things of greater permanence, which are far more valuable than any other class of plants.

Mr. Allen said that through this country young people are mostly uneducated in regard to plants, and until they are properly instructed in this direction, knowledge and taste in relation to these things cannot become general. Today the followers of fashion in New York would as soon wear a cauliflower as a Cattleya, if it were only fashionable. A man came to him once with a large order for forced ox-eye daisies, and willingly paid seventy-five dollars per day for three weeks, during which time the supply was furnished. It was merely caprice which made the flowers valuable. As soon as the people become educated to see something beautiful in plants besides color, trees and shrubs will be better appreciated. In the old countries, they cultivate old flowers because they love them. Plants that were pictured in

1612, are just as much prized over there today, as they were in those old times. When the people are educated aright they can see as much to admire in a well grown plant, even without a bloom, as in a fine flower.

Jackson Dawson remarked that a new plant receives the same expression of approval from this Society, if it shows any superiority over the older varieties, whatever class it may represent. He wanted to call attention to the greater length of time required to get satisfactory results when one attempts to produce a new and decidedly superior rhododendron or other shrub, and especially a tree, compared with the time required in such attempts with herbaceous plants, and particularly with annuals. In the former case the work covers a term of from three or four years to perhaps ten years, while in the latter one year may complete it. But, on the other hand, the bedding plant is in perfection in a year or two, while the shrub or tree will not only continue many years, or perhaps a lifetime, but will increase in beauty and value every year. Moreover this work must be done by a person who has had a thorough training in gardening operations, and who has a natural taste for such work. Societies do not look at these things from this point of view, and, therefore, do not appreciate them as they deserve.

Mr. Allen agreed with Mr. Temple's view, that the Massachusetts Horticultural Society should recognize plant values in proportion to their cost. He added that he should like to live to see the time when the producer of a valuable new variety of tree or shrub — a choice azalea for instance — will be paid liberally for the skill and knowledge as well as the time devoted to bringing it out.

Mr. Temple thought that the horticultural societies of this country had, during the past twenty-five years, given too much of their attention to the improvement of annuals and greenhouse plants, and too little to the production of better trees, shrubs, or permanent things generally. He believed that these societies had lost influence by that course. There is no firm in this country doing the work for us that Lemoine is doing in France, or John Laing in England. Almost nothing is done here to encourage effort in that direction. All can see fine roses, and many appreciate them; but hardy things of high value are either not seen, or if seen are not understood. But few prizes and those small are

awarded to things in this line, and many really choice plants are consequently allowed to go back to oblivion. This is not a personal matter, but it is an important one to the country at large. This work requires the possession of great knowledge and judgment, the result of long and peculiar education, and where it is already acquired it should not be permitted to pass away and be lost through lack of due appreciation and encouragement.

Leverett M. Chase said he had been many years a teacher of boys. He had tried to induce them to experiment with fruits, for the purpose of producing new and better varieties, especially pears, and most of them enjoy it. He thought it desirable that more of us should take up this work, both in fruits and many other hardy plants. They have been too much neglected. The study necessary to prepare for it should be introduced into the schools. Now, happily, it seems probable that something may be done in this direction; at least the prospect is better than heretofore. He would like to see, in Horticultural Hall, monumental tablets to commemorate the services, and to honor the names of such noble discoverers, or producers, of good things as E. W. Bull, the originator of the Concord Grape, and Francis Dana, that single-minded, earnest seeker after better fruits, who produced so many choice varieties of pears. We should recognize and honor such laborers for they are benefactors of our race. We should not take the fruits of their study and toil as matters of course—which may not yet be styled robbing them—but should show appreciation by rewarding them.

President Spooner, called attention to two hardy plants, *Viburnum plicatum* and *Andromeda speciosa*, which were brought in from the Arnold Arboretum, and exhibited in bloom today, by Jackson Dawson, the gardener there, who is doing more than any other person to bring out the beauty and other desirable qualities of hardy trees, shrubs, and vines, and to make known their availability for garden, lawn, or park adornment.

John C. Hovey considered annuals and bedding plants as valuable as shrubs. A great advance has been made in these plants; new ones have been introduced and many new varieties have been produced, and most old sorts have been improved. We all know that asters and zinnias, geraniums and other bedding plants are invaluable for decorative purposes, as we see in the Public Gardens, at Mr. Hunnewell's country seat, and other similar

places, and no hardy trees or shrubs could possibly serve as substitutes. Moreover a large variety of bedding plants bloom all summer, while shrubs, with few exceptions, are in flower only a short time.

Mr. Temple did not mean to say that too much encouragement was given to the culture and improvement of bedding plants, but that too little had been given to efforts applied to hardy trees, shrubs, vines, etc. When he spoke of cheap annuals, he meant only those which are easily grown, and require little knowledge or skill.

Mr. Hovey believed that everybody could grow annuals.

William C. Strong said that it is natural that plants which are easily and therefore cheaply propagated should be more prominent in commerce than those propagated with difficulty. Also that, as compared with trees, shrubs would be much the same. That this is the case, is not so much the fault of the Society as of dealers, who every year make a specialty of the trade in quickly grown plants. He did not think this Society had been remiss in its duty, nor even backward in its encouragement to growers in any department. It has been accustomed for a long time, to offer Prospective Prizes to the originators of improved fruits and vegetables, and these have been productive of fairly good results. He thought it would be well for the Committee for Establishing Prizes to consider the propriety of giving additional encouragement to the production and introduction of new varieties of ornamental trees and shrubs. It certainly is a much slower process to obtain these, than a new seedling strawberry, for example, and the introducer of these should receive proportionate encouragement. The speaker said he was in full accord with the essayist in regard to the honor and dignity of the gardener's profession. Old gardeners are held in honor in England. This is relatively a new country, but it is only right that we should desire our gardeners to be as well trained, and be held in as high esteem and honor as those in the old countries. A thoroughly trained and accomplished gardener should be regarded as one of the family or of the firm, for he is, properly, a most interested party to the progress and success of the estate or the establishment with which he is identified. But there is an influence in our country which leads men who have ability, to think they should use it in some purely money-making scheme, or occupation.

Robert Manning referred to the establishment of an Experimental Garden, at Mount Auburn, by the Society, and said that, in connection with it, General Dearborn, the first President, had planned an "Institution for the Education of Scientific and Practical Gardeners." The course of instruction was intended to cover three years, and to embrace the sciences of Botany, Vegetable Physiology, Chemistry, Mineralogy, Architecture, Hydraulics, Mechanics, Entomology, and such other branches as are applicable to Horticulture, the culture of fruit, forest, and ornamental trees, shrubs, flowering plants, culinary, and such other vegetable products as are employed in the industrial arts; also training in the composition of landscape and picturesque gardens. Although this portion of the plan was never carried out it showed the comprehensiveness of General Dearborn's views of horticulture that he should have devised such a plan.

In answer to an inquiry as to how far the Experimental Garden progressed, Mr. Manning said that at the close of the year 1832, General Dearborn reported that the garden had been laid out, the paths and avenues constructed and bordered with turf, and that the whole would be in readiness for planting fruit and ornamental trees in the spring. In May of the next year he reported that under the direction of Mr. Haggerston, the gardener, more than thirteen hundred fruit, forest, and ornamental trees had been planted, and hot-beds had been prepared, and that among the seeds sown were four hundred and fifty varieties which had been sent to the Society from Europe, Asia, and South America. The reports of the meetings and exhibitions of the Society during that and the next year, show that plants of vegetables were sent to the Society's rooms for distribution to the members, and that a considerable variety of flowers and vegetables were exhibited. When the establishment at Mount Auburn was disposed of the garden was necessarily given up, but this was regretted less than it would otherwise have been, had not the experience of two seasons shown that the soil was not adapted for an experimental garden.

J. W. Manning referred to the Bussey Institution as the greatest object lesson in America. It is a place where one can study hardy tree and shrub growth from the originals, as the collections include many forms not found elsewhere in this country, and not in nursery catalogues. He mentioned as among other things, that the apple is seen there with fruit which attains only the size of

small currants. These small apples were doubtless the original apples, proving that the sin of Adam and Eve was based on the eating of very innocent looking small fruit, and also that we still have the means of original sin. He added, however, that both apples and sins have since grown larger as conditions admitted.

On motion of O. B. Hadwen a vote of thanks to Mr. Allen for his very interesting and instructive paper was unanimously passed.

The Chairman of the Committee on Publication and Discussion announced that on the next Saturday, Thomas C. Thurlow, of West Newbury, would read a paper entitled, "A Plea for Protecting Our Native Birds."

BUSINESS MEETING.

Saturday, March 21, 1891.

An adjourned meeting of the Society was holden at eleven o'clock, the President, William H. Spooner, in the chair.

The President announced the decease, at Indianapolis, Indiana, on the eleventh instant, of John B. Russell, the last survivor of the founders and corporators of the Society. John G. Barker moved that a committee of three be appointed by the Chair to prepare a testimonial to the memory of Mr. Russell. The motion was carried and the Chair appointed as that Committee, Mr. Barker, C. H. B. Breck, and Robert Manning.

Adjourned to Saturday, March 28.

MEETING FOR DISCUSSION.

A Plea for Protecting our Native Birds.

By Thomas C. Thurlow, West Newbury.

It is said of the Pilgrim Fathers that, during the first long and severe winter in this country, their hearts often failed them, and they more than once decided if they lived till spring to take ship and go back to the mother country, leaving this cold, bleak coast in the undisputed possession of wild beasts and savages. The fickle

climate, so different from that of England, so confused their minds that they more than once supposed spring had come, only to be disappointed by the return of winter in a more dreadful form, until hunger and exposure had laid more than half their number beneath the sod. At last, we read that their hearts were made glad, for "The birds sang in the woods, and there was a steady rain," and then they knew that spring had come, and they "thanked God and took courage." Not one of them it is said returned to England, but on the contrary, as spring advanced and the birds increased in number and variety — as the wild trees blossomed in the woods, and hill and vale were fragrant with the breath of flowers, they speedily forgot — and no wonder — their troubles and the sorrows of the winter, and when June came — the New England June, which no country on earth can equal for loveliness and beauty — then was their cup of joy full; and instead of writing to their friends at home of the terrible winter they had just passed through, their letters were filled with such glowing descriptions of this new world, that many, very many, were induced to come over to these rugged shores, the result of which we are all perfectly familiar with. Now this is my first plea for the birds. If this band of despondent fugitives was so cheered and encouraged by their loving and happy songs, shall not we, their descendants, inherit this same love for the birds which bring us the first tokens of returning spring, and the first assurance of milder and more genial skies? What country child but is thrilled with joy and ecstasy at the first sound of the bluebird, returning from his southern home, or the familiar peep of the dear old robin, as he hops about our yards or flies from tree to tree, telling us in unmistakable language how glad he is to return, and stop with us another season? And later on, what farmer's lad does not stop in the furrow, to watch the shining blackbird, stepping proudly on the upturned soil, or to listen to the song of the thrush as he tells him it is time to "plough, harrow, plant, and pull it up?" A little later, what child of any age is not enraptured and amused at the incomparable song of the bobolink, as he rises in the air perfectly intoxicated with mirth? And last of all, the low, plaintive notes of the cuckoo tells us that the hot days of summer are upon us, and we must be up and doing. It does appear, that if we, as a nation, need the presence of the American Eagle to remind us of our country's greatness and power, and the children in our schools

are to be constantly reminded of the stars and stripes to teach them patriotism and the love of country,—that the love and care of our country's native birds, should fill the young mind not only with a love of country, but also with a desire to be kind and loving and good.

In the second place, the usefulness of birds, in destroying insects, is established beyond a doubt. Experiments to prove this have been made over and over again, and no intelligent, observing person can deny that our common birds devour myriads of insects, which if left unmolested would increase, as the season advances, to an alarming extent. Many of our birds, during the spring months, live entirely on insects. Some of these insects, such as moths and millers, are captured on the wing; others in the larva or chrysalid state, and still others as they appear in early morning as worms, grubs, borers, etc. Those birds especially, classed as Insessores or perchers, and Scansores or climbers, are all insect-eating birds; but may later in the season take a little fruit or grain as a dessert. Those classed as Raptores or robbers (including owls and hawks) subsist partly on insects and reptiles, but the damage done in killing other useful birds, is probably greater than all the good they do. Other native birds, such as the waders, swimmers, and scratchers, are commonly classed as game birds, and although it is positively stated by ornithologists that many of these birds subsist largely on insects, still the laws are against them, and they are protected for certain months, in order that sportsmen may have the pleasure of killing them during the remainder of the year. Supposing they do live wholly on grain and seeds, as some obstinately assert when asked not to destroy them, then the farmer has the honor of fattening them in his grain fields, in order that the "city chap" with dogs and gun, may have the "sport" of tramping through his fields and pastures to shoot them.

For several seasons, a flock of quails has visited our home, and during the summer have become so tame that we could whistle them to within a few rods of the buildings. Every one on the place treated them as they would a flock of tame chickens, and they were permitted to run through the garden and nursery unmolested; but they are spotted and after a certain day in October, are killed by the sportsmen. We try to protect them, but "rainy days and Sundays" are generally taken by those who destroy them. Within my remembrance, the marsh birds have been quite

plenty on our coast between Cape Ann and Hampton, but now it is a rare thing to see a yellow-leg, plover, snipe, or sandpiper. In the meantime the grasshoppers have increased, as the birds have decreased.

I am told that in the State of Illinois the laws are such that there is a heavy penalty for killing a prairie chicken or quail until a certain day in the fall, and that no farmer or farmer's son is allowed to kill any of these birds, even on his own land, till the day arrives, when the sportsman, ever on the alert, speedily secures the birds which have been fattened by the farmer. As a result, grouse, which were formerly plenty in several of the Western States, are disappearing like the buffalo on the plains, and it will soon be known only by picture.

It is a singular fact that the game laws of this country generally favor the sportsman, and more singular and painful still, that some of our agricultural and horticultural periodicals should cater to the sporting gentry, and even recommend planting certain trees and shrubs for parks and game preserves. I have not had time to inform myself fully on the present game laws of Europe, but my impressions are that, years ago, the German government, thinking the birds destroyed their fruit and grain, recommended the promiscuous killing of all birds; but in a few years the insects so increased, as to threaten the destruction of all their crops, and strenuous laws protecting birds were at once made, which continue in force at the present time. If I mistake not, Spain has learned that the destruction of her forests has so diminished the number of birds, that great losses to crops have resulted. I will not pretend to say that if the birds had all been permitted to live there would have been no damage done by insects; but it must be admitted, that at the settlement of this country, when the primeval forests protected thousands of birds which now have no such protection, nature preserved the balance of power, and birds and insects must have lived together for generations without either gaining materially on the other. Since that time, no new species of insects have been created, though some have been imported; but through the the cutting off of our forests, the converting of immense tracts of wild land into corn and grain fields, and the multiplication of vegetable and fruit farms, the balance of power has been turned in favor of the insects, till today the formidable host is the terror of all agriculturists throughout the land.

Dr. Harris in his work on Insects, in speaking of canker-worms says: "But since our forests, their natural food, and our birds, their greatest enemies, have disappeared before the woodman's axe and the sportsman's gun, we are left to our own ingenuity, perseverance, and united efforts, to contrive and carry into effect other means of checking their ravages."

Of the English sparrow, I can say nothing from experience. As our place is somewhat retired these foreigners have never visited us, and with my present convictions I do not regret their absence. Without doubt they were introduced from purely philanthropic motives, but would it not be well for our government to establish a wise and prudent commission to prevent such mistakes as the importation of noxious weeds, the English sparrow, and the gypsy moth? Of other birds I can speak from experience. Our house and out-buildings are every year at the service of large flocks of chimney, barn, and eave swallows; the pewee and robin rear their young with all confidence under the covings and brackets of our house; the bluebird looks every spring for her box in the apple tree; the oriole, the cat bird, and the thrush, all build in their own chosen spot within easy call of our home, and the sparrows have become so domesticated that they daily look for food within a few feet of our doors. As a result the tent-caterpillar is fast getting to be a thing of the past on our place; the canker-worm has nearly disappeared, and the cut-worm and the June-bug, formerly abundant, are now seldom seen. An abundance of evergreens and hedges about the place, while they serve to beautify the landscape, and form barriers against winds and cold, become a retreat for birds in which to build and rear their young, comparatively safe from the attacks of their enemies. Piles of brush, left in the pastures and orchard, although presenting a slovenly appearance, are the places generally chosen by the thrush, and often by the cat bird and robin. One serious obstacle in discussing this subject as we do today, is the prevailing, and, I fear, of growing, opinion that these same birds do more injury by eating fruit, than they do good in destroying insects. I have met in a fruit growers' meeting, apparently intelligent and observing men, who would declare that the robin was a nuisance and a thief and deserved extermination. I am aware that a flock of birds will often despoil the fruit on some favorite early pear, cherry, or peach tree and that a few Delaware grapes, currants, or raspberries will quickly disappear, but the

extensive grower of small fruits, cherries, or pears, will find very little, comparatively, destroyed. My father formerly raised over a hundred bushels of cherries annually. No perceptible damage was done by the birds, except to the earliest and latest in ripening. We always expected the birds to eat what they wanted, and never thought of frightening them from the trees. Why this great outcry against the robin, I cannot tell, but with your permission will quote briefly from others who are high authority.

Mr. Samuels, in his "Birds of New England," in speaking of the robin says: "Perhaps none of our birds are more unpopular with the horticulturists than this; and I will give the observations of different scientific men, and my own, to show that the prejudice against the bird is unjust and unfounded."

Professor Treadwell, of Cambridge, reports: "The food of the robin while with us, consists principally of worms, various insects, their larvæ and eggs, and a few cherries. Of worms and cherries they can procure but few, and those during but a short period; and they are obliged, therefore, to subsist principally upon the great destroyers of leaves — canker-worms, and some other kinds of caterpillars and bugs. If each robin, old and young, requires for its support an amount of these equal to the weight consumed by this bird, it is easy to see what a prodigious havoc a few hundred of these must make upon the insects of an orchard or nursery." Further on, Mr. Samuels says, "Wilson Flagg, an acute and careful observer of the habits of our birds, gives some of his experiences of the robin, as follows. He says, '. . . . the more I have studied his habits, the more I am convinced of his usefulness. Indeed, I am now fully persuaded that he is valuable beyond all other species of birds, and that his services are absolutely indispensable to the farmers of New England. Some persons believe that the robin is exclusively a frugivorous bird, and that for fruit he will reject all other food that is within his reach. Others believe that his diet consists about equally of fruits and angle-worms, but that he is not a general consumer of insects. The truth is, the robin is almost exclusively insectivorous, and uses fruit, as we do, only as a dessert, and not for his subsistence, except in the winter, when his insect food cannot be obtained. He is not omnivorous like the crow, the jay, and the blackbird. He rejects farinaceous food unless it is artificially prepared, derives almost his entire

support from insects and grubs, and consumes, probably, a greater variety of species than any other bird. I am entirely at a loss to account for this very prevalent and mistaken notion respecting the frugivorous habits of the robin.'"

There is also a prejudice against many other insect-eating birds, though it may not be as strong as that against the robin. The oriole has been accused of eating green peas. The cat bird and thrush have been known to eat raspberries; and some farmers shoot the red-winged blackbird and hire boys to break up their nests, because they say they have been caught in the very act of pulling up a hill of corn. But alas for the poor bobolink! I have heard it positively asserted that these birds would destroy the whole rice crop of the south, unless active measures were taken for their destruction. There is no doubt that large flocks of these birds have been known to hover over and light down upon the rice-fields; but I cannot but think that the amount of damage done by them has been greatly exaggerated, and would kindly suggest to our Southern friends that this whole matter be carefully examined, to see if the damage done by the host of constantly increasing insects is not very much in excess of that ever done by the birds. One thing is certain; if something is not speedily done to prevent the wholesale destruction of this, and several other species of birds, they will in a few years become entirely extinct.

I will try to name, as briefly as possible, what are some of the *enemies* to our small, or insect-eating birds. The common crow, in my opinion, does more damage by destroying the eggs and young of other birds, than he does good in devouring a few insects. I have watched him for years, and have seen hundreds of robins' and other birds' nests destroyed, the eggs eaten, and the young taken away. Hence the robin has learned to seek shelter near the habitations of men. Last season a crow came into a small tree not three rods from our house, and killed two out of a nest of young robins, before he could be frightened away. I would recommend that all crows' nests in the vicinity of our farms be destroyed, and perhaps, also, that the state offer a small bounty on his head, as is done in other New England states.

I am sorry to believe that the beautiful jay is often guilty of the same mean business. Cats are useful animals, if well treated and trained, but a superfluity of uncared for, hungry cats, is a very great nuisance, and often destructive to young birds. Owls and

hawks, if plenty, will kill small birds; therefore keep them at a distance. The red squirrel is destructive of many species of young birds, and I should advise shooting them every time they are seen. The increase and improvement in fire-arms, has proved a temptation to many a man and boy, who for a few dollars can now buy an improved breech-loading gun, such as few of us ever dreamed of forty years ago. Unless educated to the contrary, thousands of school-boys will thoughtlessly indulge in this exciting sport, causing the destruction of vast numbers of birds every year. It may be necessary to kill a few birds for the cause of science, but it is to be hoped that no taxidermist nor any other person will indulge in this sport for mere profit, or their own gratification.

But saddest of all is it, that in this Christian and enlightened age, thousands of beautiful little singing birds should have been slaughtered to ornament ladies' hats and dresses. What a blot upon our times for the future historian to record. But a gleam of light is breaking, when the Princess of Wales, with noteworthy courage, gives orders "that nothing need be submitted for her inspection, or that of her daughters, in which birds are used as trimming," and it is to be hoped that this noble example will be followed everywhere, especially in our own country, where everything "English," whether good or bad, is copied so quickly by our own people.

But by far the most alarming thing at the present time, is the practice, in some of the Southern States, of killing these birds during the winter for game. Last summer, a lady assured me that over a bushel of robins were brought one day, into the hotel where she was stopping, and served up for dinner; because she declined to taste them, the remark was made, — "That is all these Yankee birds are fit for." My neighbor who spent the winter in Florida two or three years ago, says he was offered twenty-five cents each for robins, at one of the large hotels. I believe most of the northern and middle states have laws to protect useful birds, but it is useless to protect and foster them at the north, to be killed in winter at the south.

It is very evident that the time has come, when there should be strong and effectual national laws for the protection of our birds, and also that we should have the sympathy and coöperation of all adjoining countries and islands.

This Massachusetts Horticultural Society has enjoyed a long and honorable record; whatever it advises and endorses commands the attention and respect of the whole country. What better record could we make today, than to pass a resolution advocating and approving of strong and effectual national laws for the preservation and protection of all our insect-eating birds; also asking the coöperation of all kindred horticultural and agricultural societies, to help on this good work. Such an influence brought to bear from all quarters upon our representatives in Congress, might speedily bring about the desired result.

Discussion.

President Spooner in calling for remarks upon the subject of Mr. Thurlow's paper said it was one of the most important that could engage the attention of horticulturists, and he hoped there would be a free expression of thought upon it.

Rev. Calvin Terry said he loved the birds, and had always loved them from his childhood. When a small boy he knew all the kinds in the region round, and knew their habits and their nesting-places; he could interpret their songs or notes, and imitate them so that they would come at his call. But he grew up with prejudices, derived from older people, concerning many birds, and classed them as mischievous,—wrongfully as he had since learned, for his observations had taught him to drop one species after another from the black list, till now but very few remain on that list. It is true, as the poet says in the old school books, that "kites, hawks, and owls deserve their fate," but not so with the warblers around our homes. There is not much for us to do in destroying the native birds in order to check their too great increase; Providence has taken care of that, for birds destroy other birds, their eggs, and their young; and cats are worse than birds as destroyers, so that their number is kept quite uniform. From lack of close observation, people are often mistaken in their opinion as to the mischief birds are doing. The brown thrush, the crow-blackbird, and others are charged with pulling up corn, when, in fact, they are digging for grubs, cut-worms, etc., which are bred in the stable manure placed in the corn hills at planting time. They may bite off or pull up a little corn, but the holes made in the ground are oftener those made to get the worms. As to the crows, bounties have been paid for their destruction because of

the mischief they do in the cornfields. They are really the most useful birds we have; they are great scavengers; they carry off every dead snake, frog, and mouse—every kind of carrion, which would breed pestilence were it not thus removed. And as to pulling up corn, they can be educated out of that. The speaker said that they do not pull up his corn, and have not for thirty years. When he first came to the place where he now lives they pulled up his corn some, but he taught them better. Generally they do not pull up much except in a very cold, rainy day, when they will do more harm than in an entire week of fair weather. But just set a steel-trap baited with a rotten egg and catch one of the crows, and all the crows in the region will see it, and shun that field, especially if you hang up the dead crow in the field.

He has in his home a painting made by the artist of the family, representing a venerable crow, slightly gray, holding in one foot a wild turkey quill pen, and standing upon a large, dilapidated book, such as were made two or three hundred years ago. The idea of the artist was to represent an ancient historian, with his record of colonial times brought down to date. The crow is a very bright and wise bird, long-lived—a century or more—and could it speak our language it could doubtless tell us many things which would be interesting to hear. A little back of the speaker's house is a grove of evergreen trees, in which are the homes of about eight crows all the year round. Alike in summer and winter their cheerful notes ring out even when no other living thing can be heard, making the gloom of winter brighter. There they build their nests and rear their young every year; but though he never knew of any person destroying a nest or killing a bird, the number remains the same from year to year, the young, probably, being sent away to colonize other regions, while the parent birds remain. These, daily, and especially in winter, fly over to the beach to feast upon dead clams and other refuse from the sea.

Mr. Terry's observation as to robins is that they feed, not upon insects as the essay has it, but upon earthworms, angle-worms, cut-worms, etc. True they take some cherries, and where there are but few grown they will take all; but if there is a great abundance they will not seem to diminish the quantity much, and as a Connecticut writer says, "Who can grudge them a few cherries as a relish with the worms they destroy for our benefit?" And who can describe their waking-up carols in the first blush of

a May morning! In his experience the cat bird is a much worse cherry thief than the robin, and the oriole is bad. But none of the birds are as bad as the mischievous boys and girls (some of even larger growth) who break off the branches and damage the trees in their efforts to steal the fruit. There is great need that these should be educated to better things and ways in relation to their neighbor's fruit; and also as to the destruction of our valuable birds.

Yesterday the speaker heard the cheery notes of the bluebird and phebe, and this morning a quail whistled near his home, saying "Spring has come!" They are better indicators of the seasons than is the weather bureau at Washington.

Mr. Terry had a little story about the crow, and as his children used to say, "tell us what you know yourself, then we shall know 'tis true," he would relate it. When he was a small boy there was a tame crow in the village, which was allowed free access to the houses, kitchens, parlors, sitting rooms, etc., and it became a great thief and nuisance, carrying off thimbles, spectacles, spoons, scissors, etc. He himself had a brood of eleven young chickens. One day as he went to feed them there were only two alive; the little feet and other remnants of the rest were lying around to tell their fate. The next day that crow came again to finish the brood. Now it wore a *red feather*, taken from a military cap, directly over its crop. Mr. Terry took his little gun and just put a shot through that red feather and that crow did not steal any more spectacles or chickens. And he heard that the good women in the village said he deserved universal commendation. The moral of this story is that crows, as well as all other creatures — men and women included — should be kept in their proper spheres as Nature ordains by her laws.

Francis H. Appleton said the subject under discussion was brought before the Massachusetts House of Representatives last year, and the result of its consideration was the adoption by that body, on May 28, 1890, of the following resolution:

Resolved, That the Board of Agriculture of Massachusetts be and they are hereby requested to make inquiry and investigation as to the birds that inhabit the State, and report thereon as to their character, habit, and value as insect destroying and grain and fruit destroying birds, and advise on such legislation as may be necessary for the protection of private and public interests.

In accordance with this resolution, the Board of Agriculture employed Dr. B. H. Warren, State Ornithologist of Pennsylvania, to prepare and deliver a lecture on the birds of Massachusetts, at their public winter meeting in Worcester, December 3, 1890. This lecture and the lengthy discussion which followed it will be found in the report of the Board of Agriculture of Massachusetts for 1890. In addition, the Board, by its Secretary, made careful inquiries of intelligent persons in our own State, and corresponded with ornithologists in other States and foreign countries. As a result they reported that, as a whole, the native birds of Massachusetts are benefactors. The small losses occasioned by the raids of some species upon our fruit trees, gardens, grain fields, and poultry yards are repaid many fold by the benefits resulting from the destruction by them of injurious insects, field mice, and other vermin that are a detriment to agriculture. It is, however, the opinion of ornithologists that crows cause a greater loss in the cornfields, and by destroying the eggs and young of useful birds, than they are capable of repaying by the exercise of their good qualities. But most of our birds of prey, as hawks and owls, by their services in the destruction of field vermin, are thought to more than make good all damage they cause in the poultry yard and otherwise.

The English sparrow, (*Passer domesticus*) was the subject of extended inquiry, and it seemed well substantiated that its character is wholly bad, and that it should be exterminated. This led to the consideration of methods to secure that desirable object. The system of state bounties was quite fully discussed in Dr. Warren's lecture, and thoroughly condemned, as an utterly futile expedient. He quoted many facts from reports of investigations made in Pennsylvania, which proved that great frauds were successfully practised under the bounty law of 1885, styled the "Scalp Act," under which about $150,000 were drawn from the public treasury, as bounties for the destruction of wild-cats, foxes, minks, weasels, hawks, and owls other than the saw-whet (*Nyctea Acadica*); the rate being two dollars for each wild-cat, one dollar for each fox, and fifty cents per head for all others. Their investigations convinced the inquiry commission that about $80,000 of this money was paid for the "scalps and ears" of hawks and owls, and mostly of species more beneficial than harmful. Furthermore, the ignorance of officers who disbursed the money, in many cases subjected

them to most barefaced frauds, as it was shown that among the scalps of birds brought in, and for which the regular bounties were paid, there were "heads of common domestic fowls, partridges, cuckoos, and butcher-birds; and, strange as it may seem, even two heads of English sparrows, which the officers were made to believe were heads of blood-thirsty, fowl-devouring hawks or owls." "In one county upwards of two thousand dollars were paid to a party of hunters for a mule's skin and a buffalo robe, which were cut into pieces and 'fixed up' so that they passed for 'heads' or 'ears' of predatory mammals, or possibly the wise (?) magistrate accepted a portion of them as the heads of hawks or owls." Also "a red fox was slain in one of the mountain districts, and its pelt was cut into sixty-one parts, from which, it is stated, the enterprising hunters realized sixty-one dollars for their work. Birds of prey, as well as other animals on which bounties were allowed, were shipped to Pennsylvania from neighboring states; in this way large amounts of money were fraudulently obtained. As one instance, Crawford County, one of the western districts, joining the State of Ohio, paid over ten thousand dollars, and of this sum it is said about seven thousand dollars were paid for hawk and owl heads." Dr. Warren, in connection with Dr. C. Hart Merriam, Ornithologist of the United States Department of Agriculture, "carefully examined the contents of the crops and stomachs of over three hundred and fifty hawks and owls on which bounties had been paid." They found that "ninety-five per cent of the matter consisted of the flesh of mice, other destructive quadrupeds, grasshoppers, and many injurious beetles." This was done early in 1886, and this evidence, in addition to that of the many frauds perpetrated, caused the repeal of the bounty law of 1885. Dr. Warren recommended that permission be granted for poisoning the English sparrows during the winter season, when nearly all of our native birds are absent.

Mr. Appleton stated that the present legislature have under consideration the establishment of a commission, to meet a like commission from each of the other states, for the purpose of concerting measures which would, if adopted by all the states, secure, throughout the country, uniformity in methods of dealing with the subjects which should be brought before this joint commission and reported upon by that body. He suggested that, as the English sparrow has become a recognized evil in all the more thickly settled parts

of our country, the question how to exterminate it might possibly be referred to this commission if, as is now hoped, it is established in the near future.

Edmund Hersey's experience had in the main been different from that related by Mr. Terry. He never has any trouble from the crows. As long as he treats them well they treat him well. He generally "lines" his field, and they build their nests within ten rods of the cornfield. One year his corn was quite near the house, and one morning he felt sure the crows were there pulling up his corn. He therefore killed one, but upon examination was convinced that he was mistaken. However, the dead crow was hung up in the field, and lines strung around the whole area. Notwithstanding these supposed preventive arrangements the crows came and pulled up corn, even within a few feet of the dead crow. Mr. Hersey could not understand why they did so, unless they believed that having the name of doing it they might as well have the game; or that they reasoned as some human beings do and pulled the corn to avenge the death of their comrade.

J. W. Manning believed that crows possess the gift of communicating ideas to each other. He knew of a case where crows were poisoned with arsenic because they had pulled up corn, and dozens of them died. No crows pulled up corn on that farm again for five years. When crows came there later it was believed they were either of a strange race, or of a generation so many removes from the original mourners as to have lost respect for the tales or traditions of their ancestors.

Leverett M. Chase regarded the crow much as the old deacon did his young wife—"Not a very great saint but a mighty fine little sinner." He had tamed two of them and found them most delightful and interesting pets—bright, intelligent, and teachable, but busy thieves. The crow seems more human than any other bird, especially in his vices—avariciousness, suspicion, greediness, cruelty—and in one case he had observed a sad inebriate. He had long made our native birds a study and believed that with one exception they do far more good than harm. Their preservation is well included among the interests our Society was founded to foster and advance; for their destruction means the destruction of our fields, forests, and gardens. As birds grow fewer, the labors of the husbandman increase, and the rewards diminish.

Losing our birds means not alone the loss of the jewels of the landscape, beautiful in form and color, — not alone the exquisite melody, so harmonious and sweet that good Saint Isaac Walton exclaimed, "Lord what music hast thou for saints in heaven, when thou hast such music for bad men on earth!" Not alone examples of conjugal affection, sacrificing parental devotion, gratitude, cheerfulness, intelligence, architectural skill, — not alone are the finest sensibilities outraged; we suffer in physical comfort, financial advantages, and in our general well being. Forty years ago one could see a thousand birds while taking a summer drive; now we may travel miles and not see a bird, unless it be the pestiferous English sparrow.

The poor innocents have indeed found this an unkind world and are fast disappearing before the birds and beasts of prey; the boys and men armed with breech-loaders; the destruction of our forests; the electric wire and lights; the pot-hunter and market man, and — worst of all — Christian women ruled by the dictates of thoughtless, ridiculous fashion. The Audubon Society of New York finds that more than 25,000,000 of our most beautiful birds are annually slaughtered, their skins stuffed with arsenic and worn, entire or in pieces, by females who claim to be gentle, tender, sensitive women. Shame on a cruel and barbarous fashion which was, as is well known, established by a Parisian harlot and which no decent women can knowingly imitate! We can but think of that Roman matron who had great sport in seeing two hundred and forty Christian men, women, and children torn piecemeal by lions on a single day.

The extent of the traffic in bird skins is shown by a few facts. In 1880 a New York house received an order from England for 600,000 ox-eye sandpipers. A single ball dress worn in New York City in 1883 was covered with a thousand Brazilian humming birds. A friend of undoubted veracity told the speaker that he saw more than three bushels of birds, — none larger than the robin — brought at one time to a hotel in Florida at which he was a guest.

We are encouraged by the fact that the best men and women are now doing a great work in preventing this destruction. Queen Victoria and the Princess of Wales have emphatically expressed their disapproval of the use of birds in any manner for personal decoration; the latter having ordered that no designs for her own or her daughter's costumes shall include any birds or parts of birds.

Mr. Chase highly praised those earnest, humane persons, Henry Bergh of New York, his associates and successors, and George T. Angell of Massachusetts, who have labored indefatigably to prevent all cruelty to animals, and to preserve to us our native birds. He believed much could be done in our schools by having all the pupils taught to understand not only the economical but the æsthetic value of our birds. It would seem that Mr. Angell and others engaged in like beneficent labors, were specially raised up to devote themselves to works that appeal to, and develop the better side of our nature in behalf of the helpless of either the human race, or the lower animals.

Robert Manning asked whether the cat could not be trained to hunt and kill the harmful kinds of birds, and leave the useful ones. He spoke of a neighbor's cat which was seen to spring into the midst of a group of chickens that were feeding from a dish; but when puss left the spot she had an English sparrow in her jaws instead of the chicken the lookers-on expected to see.

Mr. Hersey said a cat could be cured of the habit of killing chickens or birds by securely fastening a dead one under her chin for a few days.

Mr. Chase spoke of the robins as great favorites of his. Beside their tunefulness they are very useful in destroying cut-worms and many other kinds of injurious insects. It has been estimated that the robins alone, by their consumption of insect pests, save crops in the United States to the value of $20,000,000 annually. They are in the garden and the field early in the morning getting the cut-worms which a little later are hidden in the earth. Then they seek other worms or some variety or form of other insects, almost their entire food being of this character. The thrush is the best of all scavengers, feeding upon the ground, collecting and devouring great swarms of insects with much waste matter beside.

Mr. Chase said he knew the character of the English sparrow, in Europe, before it was brought here to make trouble for us. Several of the countries over there are trying to rid their lands of the nuisance. He said he did all he could to prevent its introduction into the United States. They are most pugnacious and persistent in their attacks upon other birds, a cat, a dog, or even a child. They will gather in large numbers, twitter incessantly, and make feints of attack from all sides, thus harrassing the object of their dislike until, to be rid of the annoyance, the victim will leave

the place to the successful sparrows. Thus they have driven out nearly all of our native birds, which are sorrowfully missed from our gardens, fields, and woods. These sparrows go courting in an interesting way. Sometimes twenty gallants will come after one female, paying their attentions like other bipeds, ruffling up their feathers to show themselves off to the best advantage, chattering, fluttering back and forth about her, promising deathless devotion, flattering, pleading, bowing, scraping, but Miss Unwed seems in no haste. When an undesirable party comes too near, she gives him a sharp peck, and he is off, with a sore head and aching heart. But as soon as she makes her choice, the rejected parties all retire, probably congratulating themselves upon their fortunate escape. Wedding festivities are short, and, sad to say, immediate preparations to raise a family are entered upon. Sometimes several broods are raised in a season. They are seen building their nests as early as the last of February, and half-grown birds have been found as late as the last of November. The speaker had often noticed albinos and part albinos among them. This tendency to albinism is far stronger in America than in Europe, especially in the northern parts. It will probably increase, because white specimens are held in high esteem by the female birds. Government reports show the universal distribution of this saucy, quarrelsome, sturdy little rascal, who, like some of our Knights of Labor, will do no useful work himself, and wishes to expel those who are willing to do any. A fight must be carried on continually all along the line, to keep him in check, as we can have no hope to exterminate him.

On motion of E. W. Wood, a vote of thanks to the essayist for his timely and very interesting paper was unanimously passed.

Francis H. Appleton, of the Committee on Publication and Discussion, announced that on the next Saturday, George E. Davenport, of Medford, would present a paper upon "Ferns."

BUSINESS MEETING.

Saturday, March 28, 1891.

An adjourned meeting of the Society was holden at eleven o'clock, the President, William H. Spooner, in the chair.

No business being brought before the meeting it was

Dissolved.

MEETING FOR DISCUSSION.

FERNS.

By GEORGE E. DAVENPORT, Medford.

The propriety of this morning's discussion in connection with the legitimate work of this Society may perhaps be questioned, as the relationship is not at first apparent. I am confident, however, that it will appear, as we go on, that ferns constitute an important factor in our natural and social economy, and are entitled to be considered as something more than mere botanical specimens for the herbarium.

One of the most gratifying features in the growth and development of our Society during the past few years, has been its increasing disposition to encourage artistic taste and feeling in the different branches of its work. It was for this reason that those somewhat anomalous table and mantel decorations shown during the grand exhibition given by the Society in August, 1890, were justifiable. Such decorative exhibitions call forth the highest artistic faculties of the exhibitor, and awaken corresponding faculties in the minds of the observers. The keener the competition, the broader is the outcome, reaching out to the cultivator, who becomes animated with the desire to improve still further and in every way he can, the material upon which the exhibitor depends for his selections.

If, happily, the exhibitor cultivates his own material, as many do, then is he continually seeking for, and studying choice combinations of color and form in order to produce the most artistic and pleasing effects possible, and in this way he becomes a public benefactor and educator.

You cannot fail to remember the prevalence of ferns in that exhibition, and will readily call to mind the pleasing effects produced by the free use of the graceful and delicate maiden-hair ferns in some of the table decorations, and see at once how closely associated ferns are with the florist's art. So that here at the very outset we trespass upon the florist's province and demonstrate the right of these elegant and beautiful plants, the ferns, to become members of our horticultural fraternity.

The florist finds his colors among the flowering and foliage plants, but is obliged to seek for the highest perfection of form

and grace among the ferns, which in those characteristics are preëminent. Here we have at least one incentive for the study and cultivation of ferns, which must inevitably develop artistic taste and refinement.

I hold it to be quite as much our duty to cultivate the æsthetic side of our nature as it is the practical, and I care not what the strict utilitarian may say; any pursuit which leads us into closer communion with Nature and teaches us to appreciate and love God's works, whether it be a quest for wild flowers, ferns, or any other branch of natural history, deserves encouragement and approbation. The spirit which inspired the great Linnæus when he fell on his knees and thanked God for bestowing so much beauty on a tiny, wild flower, dear to us all, is one that is worthy of our constant emulation.

I recall with feelings of pleasurable emotion the enthusiasm shown by our revered Master in Botany, Dr. Gray, over the tiniest blossoms gathered during an ever to be remembered field day on Bear Hill, in Stoneham — an occasion memorable also from the presence of one whose memory is dear to all lovers of ferns — that pure soul, John Williamson, of Kentucky. The unbounded love and enthusiasm which filled the soul of that great and good man, Asa Gray, kept him always young and overflowing with the exuberant spirits of a boy, and I can never efface from my memory the cheery voice, the buoyant step, and the kindly greeting which always met me when studying ferns at the Cambridge Herbarium.

The study and cultivation of ferns is one of the most delightful of recreations, whether pursued in the spirit of scientific inquiry, or from an æsthetic point of view, and is to be encouraged in both directions; in the first, as contributing to our knowledge of plants and the relations which they bear to other forms of life, and in the second, as increasing the enjoyment and happiness, not only of those who engage in their study, but of others as well, through the refining influence of their beauty.

Ferns are to be distinguished in a general way, from other plants by the following aggregation of characters: their erect leafy habit and generally finely cut foliage; the presence of woody bundles of fibres in their stalks; the production of fruit, either on the under surface of the leafy portion, or in spike-like racemes on separate stalks, and the arrangement of the young fronds in the bud.

They have also in a general way a strong family resemblance one to another, so that one becoming familiar with a few forms may readily distinguish other ferns by their general likeness, even if unable to determine any particular species without close study. There is, however, a great diversity of minor characters by which different species, and even genera, are to be determined, and which require careful study.

Some are evergreen, often with glossy foliage, some are thick and leathery in texture, while others are herbaceous, thin, and almost transparent. Between these extremes there is every gradation. Some are smooth, while others are more or less covered with scales, wool, glands, or powdery substances.

These special characters, for the most part, bear some relation to the situations in which they grow; so that, given the special characters of any particular species, one may not only be able to indicate the localities where it is most likely to be found, but to point out the best mode of treatment for its cultivation.

Thus the larger and coarser ferns, as a rule, grow in moist, shady situations, such as damp woodlands, bogs, swamps, and ravines, while the smaller ferns, and are generally to be looked for along mountain ranges, in dry, exposed situations, and those with a woolly or farinaceous covering, especially in regions where they are subject to long periods of great heat and drought.

Ferns vary no less in size than in their minor characters. The smallest known fern is a southern species which grows in masses, like a moss, on dripping rocks in Alabama, with fronds only from one-half to three-fourths of an inch in height. In striking contrast to this minute fern are the magnificent tree ferns of tropical regions, some of which grow to the extraordinary height of from sixty to eighty feet with immense spreading fronds.

Ferns are widely but unequally distributed in the proportion to flowering plants of about one to eight, to one to two hundred, according to the climatic conditions of the various countries which they inhabit.

As they most abound where shade, warmth, and moisture prevail they reach their highest state of perfection in the humid atmosphere of the tropics. Here their growth is luxuriant and wonderful, attaining the enormous proportions of gigantic trees with huge trunks rising to a great height, and surmounted with correspondingly enormous fronds. As we pass into cooler and

more temperate climates their size and number sensibly decrease, until in colder and extreme northern latitudes they become rare or disappear altogether.

The total number of species in existence cannot be exactly stated, partly on account of the different views held by different authors as to what constitutes a species, but an approximately correct estimate may be given as about three thousand.

In the United States they are in the proportion to flowering plants of about one to forty, this being merely an approximate estimate. The actual number of undisputed species at the present time is 169, all of which are represented in the Society's Herbarium. If to this number we add the 450 or more Mexican ferns not found, as yet, within the limits of the United States, we shall have not far from 620 or more species of ferns belonging to our North American Flora, this being a little more than one-fifth of the whole number in existence.

In former geological periods the relative proportion of ferns was apparently much greater than at the present time, nearly four hundred so-called species of fossil ferns having been described from the coal regions of the United States alone. But some of those determinations are, it seems to me, to be received with a great deal of caution. The best pteridologist will not always venture to name a living plant from the insufficient data of a mere fragment, or from a single frond, if it be imperfect, knowing well from observation on living material constantly passing under his eye, how great is the tendency on the part of living species to vary, even in their most important characters; how much greater then must be the difficulty of determining species from the too often unsatisfactory data of the geological period, when oftentimes one can have nothing more than a simple tracing of a mere fragment in the rock to judge from. Even the one character, which of all others might be considered as the most reliable, *i. e.*, the venation, or nerve-structure, is known to vary greatly in living species; so that if we were to apply the same method to living species as is applied to fossil specimens, we might easily swell the number of our ferns to much greater proportions than we are now willing to give to them.

I propose now to give you a partial review of the life-history of a fern, as distinguished from that of a flowering plant, in order that you may understand more clearly the differences between

them, and then to consider briefly the uses for ferns, to offer some suggestions for making selections for purposes of cultivation, and to point out some of their special characteristics and requirements.

I have here some fronds of *Aspidium Boottii*, a fine, partially evergreen fern, which was first discovered by that excellent botanist and courteous gentleman, William Boott, an honored member of this Society, and named for him by Professor Tuckerman.

If we examine the backs of these fronds we shall find them to be covered with numerous dark dots collected into groups, each group consisting of a number of small, round, or oblong, capsules borne on minute stalks.

These capsules, which are somewhat analogous to seed vessels, though morphologically very different,—are technically called sporangia, and are the spore-cases of ferns, being filled with spores which are the germinating agencies by which ferns are reproduced.

Each group, or cluster of sporangia is called a sorus, and, collectively, the clusters are called sori,—meaning the fruit dots.

If we examine such ferns as our present one before they have fully matured their fruit we shall find the sori protected by a special membraneous covering, or shield, which is technically called an indusium. Ferns having indusia covering the sori are called indusiate ferns, and those without are called non-indusiate ferns.

The presence or absence, and sometimes the form, of the indusium, gives generic distinction to different groups of ferns, and their division and sub-division into sections and species is often based on the character of the indusium alone.

It is now proper to state that the fruitage of a fern plant is to be found collected in the clusters of sporangia, either on the under surface of leafy fronds, like our present one, or in spike-like racemes at the top of distinct stalks partially separated from the leafy portion, as in *Osmunda regalis*, or wholly so, as in the Ostrich fern and our common Sensitive fern. Ferns like these last are said to be dimorphous, *i. e.*, having two distinct kinds of fronds. But in all cases, however much the different kinds of ferns may and do vary in their manner of producing sori, the sporangia are filled when mature with a fine almost impalpable powder, which a microscopical examination shows to be composed

of innumerable grain-like bodies termed spores, the production of which is the ultimate end toward which the whole life-work of a fern is directed.

The enormous quantity of spores which a single fern plant produces annually is something almost beyond computation; but it is so great that if all the spores produced by all the ferns in existence for one year only were to germinate and consummate the purpose for which they are created, they would speedily overrun the earth. But here, as in other directions, are seen the wonderful provisions of nature for equalizing the distribution of life forms. It has been estimated that a single fern will produce in one season one thousand million of spores, and that a single frond of *Aspidium Filix-mas* is capable of producing eighteen millions of plants. Now if we consider the number of fronds which a thrifty plant will support we shall begin to form some idea of the enormous increase which a single plant might be capable of. If we consider further how great a number of individual plants there are in existence, we may well be amazed at the almost inconceivably vast number of ferns which a single year's dissemination of spores is capable of producing. But it is not until we consider still further how infinitesimally small a fractional portion of the whole all this is that we begin to realize, or form an intelligent conception of the magnitude of this grand universe and its marvellous creations.

If we shake gently a mature fern frond, spores will be seen to fall in a showery mass of dust-like powder which very much resembles in general appearance the pollen of flowering plants, such, indeed, as one sees every spring distributed over the surfaces of sluggish pools and streams from willow and alder aments.

But this resemblance goes no farther. Pollen grains in themselves have no germinating power whatever, and remain inert until they perish, unless they come into contact with some stigmatic surface. *Per contra*, every spore has within itself the power of germinating, and under favorable conditions is capable of producing a plant organism. We shall see, however, in a moment, that the plant organism which its germination produces is not a fern, and bears no resemblance whatever to the parent plant from which the spore was produced.

Herein lies the fundamental distinction between a spore and a seed. A seed contains, plainly visible within itself, the rudiments of a new plant, which develops at once, whenever germination

occurs, into a plant similar to that from which the seed was itself produced. But a spore does not contain an embryo, being filled with a thick gelatinous matter instead. On germination taking place this gelatinous matter swells, and expands the elastic inner membrane until it ruptures the outer covering of the spore, and the spore cell protrudes in the form of an elongated sac.

Development then proceeds, through the process of cellular expansion and division, until a flat, leaf-like body is produced, which in its turn, by a new process of growth, develops special fertilizing organs through whose agency the young plant is brought into existence. This form of plant life, so utterly unlike that which is destined to arise from it later on, is technically called a prothallus, or prothallium, meaning thereby an elongated, flat, cellular structure preceding the formation of some plant structure of a higher order. This condition, in some of the lower orders of plants, is in itself the perfected plant structure, as those of you who are acquainted with the Marchantias, and similar plants, know.

I will not weary you with a description of the special organs which are evolved from the substance of the prothallium, nor with the technical points involved in the gradual development of the fern plant itself. Those of you who care to pursue inquiry in that direction further will find the subject carefully elaborated in the series of text-books by Hofmeister, Sachs, De Bary, Bessey, and others. I have dwelt upon it thus far only that you might see how very different from the life-history of a flowering plant, the life-history of a fern is. In the one case we have a plant producing a seed which in its turn reproduces directly the parent plant; while in the other we have a plant which produces an organless cellular body, which produces an entirely different and independent plant form, which in its turn reproduces the original parent plant. So that the cycle of generations runs thus: the fern produces a spore, the spore produces a prothallium, the prothallium produces a fern.

I have here two fine charts, from Dodel-Ports' magnificent work, which illustrate fern reproduction admirably.

In Part 2, plate I, figure 5, we have a portion of a frond of *Aspidium Filix-mas*, one of the shield ferns, a magnified portion of a pinnule showing the sori, or fruit dots. Figure 1 shows a cross section through a sorus wherein the arrangement of the sporangia on the receptacle is plainly seen, with the over-arching indusium. Figure 2 shows a detached sporangium. The elastic

ring surrounding the outer edge is called an annulus. The sudden contraction of this annulus ruptures the ripened sporangium, causing it to split open, when the spores escape, as seen in figure 3; figure 4, spores.

In Part 3, plate IV, figures 1, 2 and 3 show the appearance of a spore shortly after germination. Here we have the protruding spore-sac which continues to grow in the manner previously described, until a prothallium is formed, as seen in figure 4. Figure 5, shows to us the young fern just starting on its life's work.

We have now seen the ultimate results of spore germination, and you have, no doubt, already discovered a partial reason why ferns do not increase more largely by means of spores. For while every spore may produce a prothallium, all prothallia will not produce ferns. A very large proportion prove abortive and perish. Others, being dioecious in character, and becoming separated, or being developed at different times, fail to complete their work. Even monœcious prothallia are subject to so many accidents that only an exceedingly small proportion of them ever succeed in consummating the purpose for which they were designed.

Nature has, however, endowed them with some remarkable properties by which destructive agencies are sometimes counteracted. Smith states that a prothallium may be divided into two or four parts, and each part will produce a plant bud, while Dr. Farlow has shown that prothallia sometimes produce fern plants by a peculiar process of budding without the aid of reproductive organs.

I pass over, as too intricate for demonstration here, the elaboration of reproductive organs on the prothallium, and the subsequent evolution of the young fern, and for its further elucidation refer you to the standard text books previously mentioned. There is also a very careful and elaborate paper by Henfrey, in Vol. XXI of the "Transactions of the Linnean Society," page 117, which may be advantageously consulted.

Hofmeister states that the young plant bears no resemblance at first to a fern and only gradually develops its real character. He also states as a remarkable fact in the life-history of a fern, that whereas the young fern will produce as many as a dozen fronds during the first year of its existence, after it has reached maturity only a single frond will be produced annually, and that a period of four seasons' growth is necessary for the full development of that frond.

From this time on we shall have a great diversity of rootstocks and fronds to characterize the different species and genera of ferns that present themselves to our notice. The structural characters of the most prominent groups of these are represented by the specimens on the screens. I will endeavor to explain them to you briefly by means of some actual specimens which I have selected for this purpose.

While it is theoretically true that all the varying rootstocks of ferns are morphologically related, and are all simply more or less modifications of a true stem, it is also true that these modifications have resulted in certain structural types that fix the habit of the species to which they belong. Two of these types are so marked and distinct, that if we were to base our classification of ferns upon habit alone we might separate them into two large groups, one having upright rootstocks and the other horizontal. But other important considerations enter into our system of classification, so that it often happens that both of these types of rootstock are represented in one and the same genus. The first of these is properly designated by the term caudex, meaning an erect stock or stem, and the second by the term rhizome, or rhizoma, meaning a running or creeping stock or stem with a horizontal growth. There are various modifications of these types which must be passed over for want of time, but most of them may be seen among the specimens on the board, and are designated on the tickets.

The example which I have here is the nearest approach to the true caudex of a tree fern yet known to our United States Flora, and belongs to a variety of *Aspidium conterminum*, growing in Florida and first found by J. Donnell Smith of Baltimore. In this species the caudex rises nearly a foot above the surface of the ground. Professor Robinson has noticed some indications in this direction in our common Rock Shield fern, *Aspidium marginale*, and a very clever and acute lady botanist of the Pacific slope, Mrs. Brandegee, recently called attention to some remarkable developments in the caudex of Osmunda in California.

The best examples of a rhizoma we shall find in *Pteris aquilina*, our common Brake, and *Woodwardia Virginica*, the Chain fern. In both of these ferns the stout rootstock extends under ground for a distance oftentimes of from ten to twelve feet or more.

In summing up the structural characters of ferns we have only time to say that the rootstock is the true stem of the fern, and the

fine or coarse fibres growing downward from the rootstock are the true roots. The leafy branches growing upward from the rootstock are the fronds, a frond being an entire leaf, whether divided or undivided, and with or without a special stalk. When undivided and without a stalk it is said to be entire and sessile; when having a stalk the latter is called the stipes, and the expanding green portion, whether entire or compounded, the lamina; when the lamina is divided the central stalks or ribs, running through the divided portions, are called the rachises; all of these terms being merely special ones for designating the different parts of a frond. The term frond is generally used in a double sense which is often confusing and misleading, but I think that it ought to be used only in one, and that the sense in which I use it here, — that is, to mean the entire leaf, whether with or without a stalk, and not in a sense that would lead one to suppose that it is at any time distinct from its own stalk.

We have seen that reproduction among ferns occurs naturally through the medium of spore dissemination, but there are other ways no less interesting. Many ferns multiply by means of what are called viviparous buds evolved from the epidermal cells of the lamina, or rachis, and such buds develop directly into new plants. The Walking fern is a well-known example of this, the prolonged apices bending over and rooting at their tips, and forming close mats as the young plants creep along.

A Mexican variety of *Asplenium Trichomanes* is remarkably proliferous in this way, as you will see by the illustration of it among the fern photographs on the board, and the late J. Warren Merrill, who was an ardent lover and cultivator of our native ferns, succeeded in multiplying his plants of that rare and curious fern, *Asplenium ebenoides*, by taking advantage of this habit. Indeed, among the Spleenworts the occurrence of these adventitious buds is not only frequent, but some species are especially proliferous in that direction. I have counted as many as twenty or more tiny plantlets sprouting from such buds on a single frond of *Asplenium Glennei*, a small fern not over five inches tall.

Still another mode of propagation is by means of small bulbs produced on the fronds much in the same way as the bulbs are produced on the common tiger lily of our gardens. A notable instance of this is seen in our Bladder fern, *Cystopteris bulbifera*, which produces small bulbs that fall off when matured and, germinating,

produce directly new plants. Sometimes bulbs germinate while on the parent plant, and specimens may often be gathered having young ferns growing out from different parts of the old fronds.

Still another mode of increase is by underground runners, or stolons, extending from the old rootstock, and forming new crowns from which new plants arise. The best example of this that I know of is the Ostrich fern, an old rootstock of which will send out runners to start new plants, which, in time, will send out new runners radiating in all directions until a whole colony of plants springs up and takes possession of an extended area. From a single plant of this species set out in my own grounds some ten years ago, I counted last season over forty crowns all of which are probably connected together by means of these stolons. It will be seen from this how readily such species may be propagated by separating the crowns, and as the Ostrich fern is one of the noblest and most attractive of our native ferns, every lover of beautiful forms having a place for it should cultivate it.

This brings us to the most vital part of our subject to those of you who may be interested in ferns otherwise than botanically. Of what use are ferns, and why should we regard them with any special favor?

We have already seen that they are of use to the florist in furnishing him with graceful forms to add charm to his decorations, and I claim further for our native ferns that they not only equal exotic ferns in loveliness but that they may be cultivated as easily and made to render our homes and gardens more attractive.

We have only to glance over some of the foreign catalogues of plants to see how highly prized our ferns are abroad, and how extensively they are cultivated, and then to wonder why they do not receive more attention here. I am under no necessity for making a plea for them as beautiful objects in nature, capable of inspiring the liveliest emotions of pleasure in the minds of those who seek them out for the enjoyment derived from a contemplation of their many graces and the study of their peculiarities for botanical or scientific purposes, but I press upon you their claims to a more favorable consideration as desirable plants for your gardens and your homes.

Many species of our larger ferns with a little careful attention may be grown into grand and imposing specimens alternating with other plants along garden borders, or in suitable places here and

there on our lawns, by giving to them a rich bed of natural soil, no manure, but plenty of water, and spraying occasionally with hellebore to keep off the insects which are liable to prove the only real difficulty in the way of cultivating fine specimens. I have only time to mention as among the finest of such ferns, beside the Ostrich fern already mentioned, *Aspidium Goldianum* and *A. Filix-mas*, *Asplenium Filix-fœmina*, and the Osmundas. These, and similar ferns with stout candiciform rootstocks forming large crowns, will thrive better in garden soil than those ferns with running rootstocks like the Chain ferns, the Sensitive fern or the Brake, and others, which require more moisture and consequently thrive best in wet places.

The one guide of all others to follow in cultivating our native ferns is to observe carefully the conditions under which the species reaches its highest development and to endeavor to supply them as far as possible when transplanting.

Among the smaller ferns are many hardy species well adapted for rockeries, which may be so cultivated, readily, by giving to them as nearly as possible conditions similar to those of their native habitats. Even those not hardy may be so grown during the summer months, and afterward taken into the conservatory or house, for the fernery during winter. Among the latter are some of our loveliest ferns, some species having fronds beautifully and delicately cut into numerous bead-like segments, or more or less covered with differently colored scales, or powder, like the Gold and Silver ferns of California.

We are now approaching the best time of all the year for beginning the study of ferns. A few weeks more and they will be pushing up their graceful fronds everywhere in woods and ravines. From their mossy couches on springy hummocks in swampy meadows the noble Osmundas will shortly rise and cast aside the downy coverings which have enveloped and protected them during their period of rest; while along the stony brooksides the Maidenhair and Lady fern will be unfolding their beautiful tresses that have been bound up in tight coils so long. You will have to search carefully among the stones for the young fronds of the Maidenhair as they are scattered along underground rootstocks, but you may know the Lady fern by her bronze or ebony crosiers — a name given to what we might call the nests of young fronds as they lie snugly tucked up in their winter beds, on account of their fancied resemblance to a bishop's crook.

Wherever you find one of these crosiers, you may know that you have found a fern, and by watching the gradual uncoiling and growth of the fronds from day to day you may become acquainted with the general habits and characteristics of ferns, and so gain a practical knowledge of them.

But I have trespassed upon your time too long, and I must bring this paper to a close. The subject is one that presents itself in so many different ways that it is well-nigh inexhaustible, and might be prolonged through a series of such papers. I am by no means sure that I have presented my paper on this subject in the best possible manner but I have been anxious to avoid anything like a strictly scientific technical treatment, and to make my paper merely as suggestive as possible. Beyond this I must refer you for general investigation and study to Professor Eaton's splendid work on our North American Ferns; to Professor Underwood's admirable hand-book of "Our Native Ferns"; to Professor Robinson's invaluable book on "Ferns in Their Homes and Ours," and to John Williamson's precious legacy to fern lovers, the "Ferns of Kentucky" and "Fern Etchings." These works cover general grounds quite thoroughly, but if a more scientific study is desired you will be obliged to resort to the text-books previously mentioned.

Of one thing I can assure you. In whichever direction you may choose to follow out this study you will find it a delightful one. There is an indescribable charm and fascination surrounding ferns that no other plants possess. They represent the highest types of graceful forms, and so long as the human mind retains its susceptibility to the influence of the beautiful in nature so long will ferns continue to attract and interest mankind.

I need say no more, but let the ferns shown here this morning speak the rest for themselves, and I am sure that you will agree with me when I say that they are more eloquent than any words of mine. For however much one may feel the inspiration which emanates from them there is yet something wanting in the power of speech to give it utterance. We may, indeed, describe in impassioned words their outward charms, but the essence of all, like the aroma of the pine woods and the odor of spring flowers, escapes into that rarer atmosphere which bathes the soul in unspeakable delight. There are times when the overpowering mastery of our feelings prevents all outward manifestation, and

we can only bend in silent reverence for that Supreme Being who has surrounded us with so many things to make life worth the living, and endowed us with capabilities for their appreciation and enjoyment.

Discussion.

Thomas Harrison inquired about methods of multiplying fern plants.

Mr. Davenport replied that he had never attempted propagation of ferns; he had not even tried spores. He recommended division of the roots and separation of crowns.

Mr. Harrison asked whether in propagating ferns they always produce the same variety, or sometimes sport.

Mr. Davenport doubted the possibility of cross-fertilization; as to sports, it is a common trait of many ferns to vary in the course of development.

Mrs. P. D. Richards said she had young fern plants coming up in the pots. While she saw no opportunity for the cross-fertilization of ferns, she was aware that spores were readily taken up by air-currents and carried to distant points where their germination and growth were effected, perhaps to the surprise of the person who thus obtained these beautiful ferns. She had found unexpected treasures growing among her collection of choice ferns, which proved identical in kind with specimens in her herbarium. She said an idea prevails widely that ferns cannot be grown in our dwellings, and she wished to state that it was erroneous. She had an Ostrich fern at a west window, where it grew in vase form very successfully; she had hoped to keep it growing longer by having it in the house, but she gained only two or three weeks of extra time. She recommended *Asplenium ebeneum* for house culture.

Mrs. C. N. S. Horner was glad to emphasize the lecturer's suggestion that ferns should be more generally cultivated by the people. She knew they were more easily cultivated than the flowering plants.

Another lady stated that she had successfully cultivated the Maiden-hair fern and also the Ostrich fern. Her own experience prompted her to say with the essayist, that if any present wished for pure enjoyment at home they should cultivate ferns.

Mrs. Horner desired to say she had cultivated ferns for many years, and had enjoyed them in-doors in winter but had usually

put them in the ground for summer. Most of them grow best in shady places, but Adiantum grows equally well in sun or shade. If she had not given away a large number she would now have a square rod of this beautiful fern. She thought the Ostrich fern another desirable species, if one has plenty of room.

E. H. Hitchings wondered that no more interest was taken in the cultivation of ferns, especially our native species and varieties. Many of them are perfectly hardy and will bear more hard treatment than any other plants that he knew. Some time in the winter of 1883, he received from Charles G. Pringle, of Vermont, a package of ferns, natives of the Pacific Slope, and among them were *Pellæa Breweri*, collected September 27, 1882. He was busy at the time and laid them aside in a drawer, to be mounted and placed in his herbarium when convenient. The convenient time did not arrive until about two years after the ferns were collected. Then, after placing some of the fronds in his herbarium, he put one of the roots in water for a week or two, and then planted it in a pot, where it grew, and he now has several fronds from it in his herbarium. Perhaps this may not seem remarkable, because those ferns have to endure the long, dry season of the Pacific slope; he therefore gave another case, nearer home. On September 2, 1888, he went with a friend to Lexington and took up a number of plants of the Ostrich fern, intending to set them out in the woods near home. They were left in a basket in the cellar until May 28, 1890, — nearly twenty months — when he found them still alive and growing. He then set them out and they grew well during the season. Besides the Ostrich fern, he had planted the *Osmunda regalis* and *O. cinnamomea*, *Aspidium Thelypteris*, *A. Noveboracense*, *A. spinulosum*, *Woodwardia angustifolia* and others. They need but very little care if planted in a suitable place, which should be in the shade, in rather rich soil, not wet, except for a few species. He thought some of our native ferns were improved when grown under glass. He said the late J. W. Merrill, of Cambridge, was very successful in cultivating many of our rarer species. Some of them are also grown at the Botanic Garden, Cambridge. David Allan, gardener to Robert M. Pratt, Oakley Park, Watertown, has grown some very fine specimens — handsomer than any the speaker had ever seen growing in their own homes. John Robinson, of Salem, recently Professor of Botany and Vegetable Physiology to this Society, has successfully

cultivated rare native and foreign varieties, both under glass and in the open air. In this connection Mr. Hitchings recommended, for any one interested in the subject, Mr. Robinson's book—"Ferns in Their Homes and Ours." The book is very interesting, even if one does not intend to cultivate the ferns. Another book he would recommend is an English work, "The Fern Garden," by Shirley Hibberd.

A few of our rarer ferns that have been successfully cultivated are:

Acrostichum aureum,
Adiantum tenerum,
Anemia Mexicana,
Aspidium trifoliatum,
Asplenium cicutarium,
" *ebenoides*,
" *myriophyllum*,
Ceratopteris thalictroides,
Cheilanthes tomentosa,
Notholæna sinuata,
Pellæa flexuosa,
Polypodium aureum,
" *Phyllitidis*,
" *plumula*,
Woodwardia radicans.

Some of them vary a great deal *in cultivation;* the *Scolopendrium* and *Asplenium Filix-fœmina* he thought more than most others, the former having one hundred named varieties. Some of our own ferns vary a great deal in their native habitats, others scarcely any. He has specimens of *Phegopteris Dryopteris* from England, Ireland, Switzerland, Maine, New Hampshire, and the Middlesex Fells, and he had never seen the slightest variation among them except in size. But *Phegopteris polypodioides* and *P. hexagonoptera* vary a great deal in form; so much so that it is sometimes hard to decide whether a specimen should be called *polypodioides* or *hexagonoptera;* in fact some persons think they are simply variations of the same species.

A few years ago Mr. Hitchings met Professor Eaton at the Harvard Herbarium rooms, and asked him where he drew the line between these two ferns. He replied: "If you find a frond that measures one-sixteenth of an inch wider than it is long, call it *hexagonoptera*, if one-sixteenth narrower call it *polypodioides*." [The speaker exhibited specimen fronds of each variety, which clearly showed the points he had stated in regard to these varieties.] But the fern that varies most is, he thought, *Botrychium ternatum*. You may collect a hundred specimens and no two of them will be alike; but you may be sure they are all varieties of *Botrychium ternatum*.

[To illustrate this statement Mr. Hitchings showed twenty-four sheets, from his herbarium, containing one hundred and forty specimens of *Botrychium ternatum* varieties, a curious and interesting exhibition.]

But to get the most satisfaction from ferns one should collect them. Shirley Hibberd, in his "Fern Garden," says, "I believe no one can thoroughly enjoy or understand ferns until after having actually hunted for them in hedgerows, woods, and amongst rocks, and rivulets, and waterfalls. The . . fern may be allowed to sing . . . :

> Through the woods, through the woods,
> Follow and find me.
> Search every hollow, and dingle, and dell,
> I leave but the print of my footsteps behind me:
> So those who would find me must search for me well."

If this were written of the little Adder's tongue fern, or some of the smaller Botrychiums, there would be a great deal of truth in it. Mr. Hitchings then quoted from Robinson's "Ferns in Their Homes and Ours," as follows:

"There is a large class of persons who . . . have to do only what they choose. This class must have a 'hobby,' or they will *rust* out. Another class are engrossed by incessant professional work which leaves them every day cross and tired. These should have some outside hobby, or they will become one-sided and crabbed, and *wear* out." For illustration he says: "Dr. Jacob Bigelow, of Boston, being a hard and earnest worker in his profession, determined, for his own good, to select some sensible form of recreation; and chose the study of botany, as necessitating long walks and refreshing thoughts. The result was the publication, in 1814, of his 'Florula Bostoniensis.'" "All this came from a hobby," says Robinson, who further writes: "Every person, old or young, outside of an asylum for the insane, should have some one thing in which an intellectual interest is taken,—some hobby, or something that may grow into one." And while he would not "claim that the fern-mania . . . is a hobby superior to most others, . . . he does claim, that, properly guided, it can be the means of stimulating pure and healthy exercise and study; and . . . may be the cause of great and permanent good."

Mrs. Piper remarked that if one would transfer a Maiden-hair fern from its native spot to the fern garden, it should be done

before the fruit had appeared, otherwise it would be too far exhausted to establish itself there.

Miss Nichols inquired if the fern garden could be protected from devouring insects.

Mr. Fernald spoke of a small insect, of a new kind, which has of late infested ferns. It draws the leaves together in a loose bunch, and then feeds upon them. The only treatment he advised was to open the bunches and kill the insect.

Interest was added to Mr. Davenport's paper by herbarium specimens, some of which were mounted on screens, as well as by the plates from Dodel-Ports' "Anatomical and Physiological Atlas of Botany." The latter and the other books referred to can be seen in the Society's Library. On motion, a vote of thanks to the essayist for his interesting and instructive paper was unanimously passed.

O. B. Hadwen, Chairman of the Committee on Publication and Discussion stated that the regular course of Meetings for Discussion closed with Mr. Davenport's lecture, but he was happy to announce that another was promised for Saturday, April 11, by Col. Henry W. Wilson, of Boston, upon his recent "Visit to the Bahama Islands, and the Character of their Horticulture and Agriculture."

BUSINESS MEETING.

SATURDAY, April 4, 1891.

A duly notified stated meeting of the Society was holden at eleven o'clock, the President, WILLIAM H. SPOONER, in the chair.

The following named persons were proposed for membership:

Everett W. Raddin, of Cambridgeport, proposed by James T. Carroll.

Dudley F. Hunt, of Reading, proposed by George Heywood, as a Life member.

George Murch, of Milton, proposed by Edwin A. Hall, as an Annual member.

Maurice P. White, of Roxbury, proposed by Leverett M. Chase.

John Davis, of Lowell, proposed by Edwin Sheppard, as a Life member.

The President, as Chairman of the Committee on the Revision of the Constitution and By-Laws, presented a majority and a minority report of that Committee. The report having been, agreeably to a vote of the Committee, printed and sent to every member of the Society, it was voted that the reading be by title and that the Secretary state the changes from the Constitution and By-Laws now in force.

Joseph H. Woodford moved that the report be accepted and the Committee discharged.

Benjamin P. Ware moved the adoption of the majority report.

I. Gilbert Robbins moved to adopt the whole report, both majority and minority. After some discussion by Francis H. Appleton, Mr. Robbins, Benjamin P. Ware, William C. Strong, and J. D. W. French, this motion was withdrawn.

Mr. Robbins then moved that the amendments offered by the minority of the Committee be adopted in place of the report of the majority.

Mr. Woodford moved to amend the motion of Mr. Robbins so that the Superintendent of the Building, and the Librarian should be chosen at the annual election. This amendment was accepted by Mr. Robbins. The vote was then taken on his motion, as amended, and it was negatived.

Henry P. Walcott moved to amend Section VI, by substituting "second" for "first" in the last line of the second paragraph; but accepted an amendment substituting "third" instead of "second." Dr. Walcott's motion, as thus amended, was then carried.

The question was then put on Mr. Ware's motion, viz., that the majority report, as thus amended, be adopted, which was carried, and the revised code was ordered, by a majority vote, to be entered on the records, for final consideration on the first Saturday in July.

The following named persons having been recommended by the Executive Committee for membership in the Society, were on ballot duly elected.

ALFRED P. GAGE, of Arlington,
MRS. LEWIS J. BIRD, of Roxbury,
CHARLES S. YOUNG, of Newton Centre,
SAMUEL HENSHAW, of Thompson, Conn.

Adjourned to Saturday, April 11.

BUSINESS MEETING.

SATURDAY, April 11, 1891.

An adjourned meeting of the Society was holden at eleven o'clock, the President, WILLIAM H. SPOONER, in the chair.

Francis Campbell, of Cambridge, was proposed by David Allan, as a Life member of the Society.

John M. Keyes, of Concord, was proposed by John H. Moore, as a member of the Society.

Adjourned to Saturday, May 2.

MEETING FOR DISCUSSION.

A WINTER VISIT TO THE BAHAMA ISLANDS.

By Col. HENRY W. WILSON, Boston.

This interesting group of islands is often confounded with the Bermudas, even by persons otherwise well informed. The latter are in Lat. 32° N., Long. 66° W., while the Bahamas extend from Lat. 22° to 27° 20′ N. and from Long. 72° 30′ to 79° 20′ W. Nassau, the principal commercial point, being in Lat. 25° 05′ N. and Long. 77° 21′ W., is about 800 miles southwest of Bermuda, 1050 miles, almost due south, from New York and about 350 miles, a little north of east, from Key West.

It is to some of the experiences and observations of a winter's visit to these islands, last February, that the attention of the Society will be called for a brief hour.

Not often can a midwinter voyage be made with bright skies and unruffled seas, with no more motion than one would meet on an excursion boat on a June day in Boston Bay. You soon fall into a regular routine of life which lasts just long enough to avoid tedium. You cannot fail to be an early riser in order to view the sun emerging as from a bath in the wilderness of waters; breakfast, and then pace the deck, fore and aft for an hour, as exercise; consult the patent log hourly, if not oftener, to assure yourself that you are going along all right; speculate as to the distance run for

twenty-four hours; superintend the captain and first officer as they take the sun and wonder why it takes thirty minutes to figure out a five minute problem; lunch; admire the great persistence of a flock of sea-gulls that for forty-eight hours and for five hundred miles hover over the track of the steamer ready to pounce upon whatever the cooks may throw overboard; wonder whether they can have any abiding place but the deep sea, or whether it may not be a handy thing after all to be able to make yourself comfortably at home wherever you may happen to be; count the strokes of the engine and estimate the revolutions of the screw to make the passage; dine; discuss the McKinley Bill and lose your patience, if not your temper, as you try to make your companion understand how a tariff is a skilful device for making foreign nations pay your own taxes for support of the Government; find quiet for your perturbed spirit in looking upon the glories of the sunset as the fiery ball drops gently below the horizon; as the twilight deepens into night and darkness draws her sable curtain over the deep and pins it with a star, you linger at the taffrail to watch the fascinating phosphorescence of the wake which the steamer is leaving miles astern. This experience is repeated day after day, varied only by an occasional sail, a flight of flying-fish, pursued by a lazily rolling dolphin, or a jaunty nautilus sailing by in its buoyant bark. At last the steamer is brought to anchor in forty-five fathoms of water, off a low-lying shore, where a stuffy little steamer comes alongside to take the freight and passengers ashore, and you realize that Nassau has a prohibitory bar which effectually closes her harbor to all steamers or vessels that draw more than fifteen feet of water. This bar is not of shifting sand, as frequently occurs, but good hard coral limestone which would effectually settle the fate of any vessel going upon it.

Approaching the wharf one is easily persuaded that about all of the floating population of the town has gathered there to greet him, but, on considering that there are but three or four hundred out of twelve thousand or more, he modifies his conclusions, as he does concerning the importunate beggars that beset him on every hand and clamor for alms. In his vexation the traveller will say these people are all beggars, but when he reflects that there are but a score or two of the persistent pests, and these only about the wharves on steamer days, he concludes that mendicancy is not so common and gives credit for there not being more of it.

The first public functionary one meets is the custom-house officer, who is obliging and discreet, and who receives and passes you with so much courtesy and dispatch that a pleasant impression is left on your mind which goes to relieve your vexation at the volunteer porters who have persisted, unbidden, in pawing over your luggage and making their needless exertions the basis of a claim for a shilling. If every traveller could bear a frown, or say no, this fruitful source of irritation would soon cease. Arriving at the hotel, which like everything else in a British colony is a Royal Victoria, and which is roomy, comfortable and excellently managed by a Connecticut hotel-keeper, you speedily make yourself at home and begin to look about you.

One observes, particularly about Nassau, the quaint and colonial aspect of the enclosures and buildings; the peculiar walls, breast-high, formed of pieces of coral limestone laid dry and then well plastered over with lime-mortar, giving to each enclosure all of the effect of exclusive proprietorship that would be given by a tight board fence. Most of the buildings, both public and private, are built of regular blocks of limestone which is easily quarried and dressed into any desired form with a hatchet and saw.

The streets of Nassau are regular, clean, and well laid out. The abundance of trees which line the streets tend greatly to relieve the bright glare of reflected sunlight, which rather oppresses the Northerner when experienced for the first time.

One of the agreeable features of a winter experience in these islands comes from the uniformly equable temperature of air and water. During the entire month of February, 1891, the thermometer fell below 70° on only one occasion, toward the end of the month, when for a part of the day it fell to 65°. The temperature at sunrise averaged from 70° to 72°; at noon from 78° to 82°; at sunset from 74° to 76°. The temperature of the ocean was, in the morning, 70° to 72° and at evening from 74° to 76°. It was claimed by old citizens that the lowest temperature ever known was 64°. The bitterly cold wave which passed over the whole of the United States and covered Florida with frost, had only refrigeration enough left, when, in the last week of February, it crossed the Gulf Stream and reached Nassau, to reduce the temperature for a short time to 65°. Such an equable climate is not only beneficial to invalids but is a source of enjoyment to those in health. It enables a careful gardener to supply the table with a

constant succession of delicious vegetables the year round. Instead of there being a dry and a rainy season, as is the case in most tropical and semi-tropical countries, the showers here fall at intervals and the rainfall of the year is quite as uniformly distributed during the several months and seasons as at the north, and averages about two and a half inches per month, which is fully adequate for perfect success in agriculture.

The extreme transparency and brilliancy of the atmosphere and sky is in great contrast to what we are accustomed to see at home. The clouds soar high and are broken into fine masses with magnificent contrasts of color. Even the waters combine to challenge our admiration by the gorgeous hues which they present to the delighted beholder. Looking from a height upon the broad surface of the bay I have seen its waters striped with creamy white and brilliant pink, with broad areas of intensest blue, flecked with bright spots, till it has almost seemed to me that the eye that designed our starry flag had at some time tarried among these kaleidoscopic views and drawn its inspiration from their glowing scenes.

The harbor of Nassau is formed by a long, low, narrow island, called euphoniously Hog Island, which lies to the north and nearly parallel with the island of New Providence, the channel between being from one-third to one-half of a mile wide, the westerly end of which, having a depth of from fifteen to seventeen feet, constitutes the proper harbor of Nassau. The bar before mentioned, which projects to the westward, in a continuation of Hog Island, and upon which the surf breaks constantly, will ever be a serious impediment to modern commerce, although small vessels enter without difficulty.

The Bahamas comprise eighteen principal islands having a total area of about 3,310,000 acres or pretty nearly three-fourths the area of the State of Massachusetts. There are several hundred small islands, or cays, of limited area, many of which are little better than bare rocks. Of these islands the largest is Andros Island, with a length of 90 miles, and an area of nearly 2,475 square miles. Abaco, Eleuthera, Great Bahama, Inagua and San Salvador, have each an area of more than 100,000 acres. The population of the whole group of islands was 43,521 in 1881. New Providence has an area of perhaps 85 square miles and according to the enumeration of 1881, a population of 11,650, most

of which is concentrated in and about Nassau. The present population is estimated at 14,000 of whom about one-sixth are white, the remainder being negroes, mostly born on the islands, and, of course, descended from the victims of the African slave trade. Close observation will enable one occasionally to distinguish in the negro quarters of the town, faces that bear in the tribal marks and scars unmistakable evidence of African nativity. These have been rescued from slave ships and liberated on these islands.

The original inhabitants at the time of the discovery by Columbus were a peaceable and inoffensive race; they were all carried into slavery by the remorseless Spaniards and their lives were sacrificed in the mines of San Domingo or the pearl fisheries of Cumana. They were of a proud and independent spirit, not yielding readily to slavery, and by the time a generation had passed away not a descendant of the Lucayan Indians remained, and for more than one hundred years these islands remained desolate and uninhabited. The negroes have a tradition that there is a remnant of these aboriginal natives yet living in the depths of the forests on Andros Island, and no negro can by any means be persuaded to venture from the coast into the forests which cover the island, for fear of the wild men, whom they call "Yahoo;" but no good foundation could be ascertained for this belief.

The white population, as stated, comprises perhaps no more than one-sixth of the whole. Many of them are descended from the same stock as our best New England population, to which there is quite a strong resemblance both in speech and manner; nor have we far to go for the explanation. A large part of the emigration to the Carolinas, in the early part of the eighteenth century, was of Scotch extraction from the north of Ireland and the same that furnished much of the hardy yeomanry of New England.

Singularly enough, while in the North these people were the staunchest patriots, in the South they were among the most ardent Loyalists and at the close of the American Revolution they emigrated in large numbers to the Bahamas. Great Britain had purchased the rights of the Lords Proprietors and made large grants of lands to these Loyalists on which were soon established many prosperous plantations. The energy and industry of these people are plainly evinced today in the clearings, enclosures and

Cocoa Nut Tree.

Showing fruit at various stages of growth.

buildings which were made under adverse circumstances. The mace which was used as the symbol of Royal authority in the assembly of South Carolina, was carried to Nassau and now does service as such in the Colonial House of Assembly.

The structure of their social and industrial systems was based upon slavery and, upon its abolition in 1837, every department of industry and trade was rudely arrested and has since languished, excepting during the brief years of the American Civil War, when the facilities which the islands afforded for blockade-running gave such an unnatural stimulus to trade and speculation that everybody plunged in, to be hopelessly stranded when the bubble of disunion was broken.

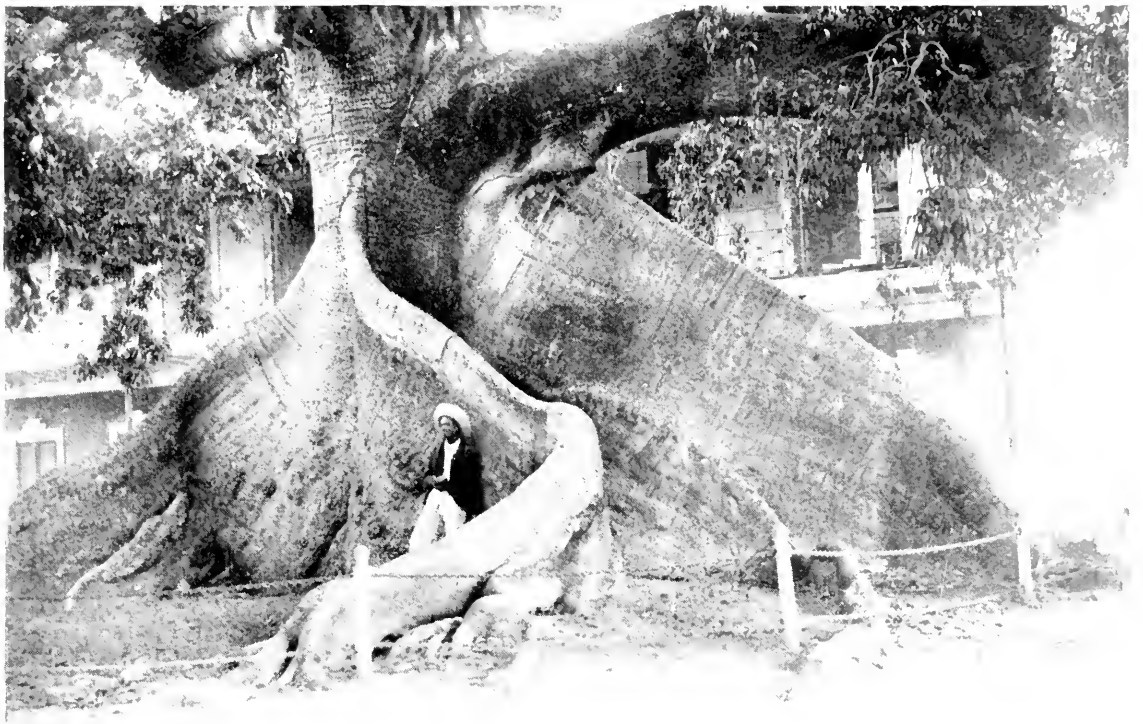
Andros Island, which is larger than all of the others put together, was named for Sir Edmund Andros who was Governor of Massachusetts from December 20, 1686, until April 18, 1689. When the news of the abdication and flight of James the Second reached the colonies, Governor Andros was seized by the men of Boston, deposed, imprisoned and sent to England. No judicial decision was ever made in his case, as the authorities were on the horns of a dilemma whether they condemned him or acquitted him of tyrannical proceedings in the Colonies, but he was subsequently appointed Governor of Virginia, where his conduct was marked by more moderation and was generally acceptable. He was subsequently one of the Lords Proprietors of the Bahamas and died in England in 1714.

William Shirley was Governor of Massachusetts from 1741 to 1756, and was, possibly, until his ill-starred military operations of 1755, one of the most popular Royal Governors Massachusetts ever had. Point Shirley is a reminder of the esteem in which he was held in Boston, and of the grand celebration on the 8th of September, 1753, when all Boston seemed intoxicated with the prospect of the establishment of glass-making at the Point,—a prospect which never materialized. In 1759, Governor Shirley was appointed Governor of the Bahamas and so continued till 1767. The rambler around Nassau cannot fail to pass through Shirley street, one of the principal thoroughfares, also named after the Governor. From these considerations, as well as others that might be added if time permitted, Nassau is peculiarly interesting to a New Englander but especially to a Bostonian.

To one who has never visited the Tropics, the strange conditions and species of vegetable life seem most remarkable; familiar

as he may be, by means of narratives or prints, with such things. still the beholding moves one with a new emotion. There is a curious interest in witnessing the peculiar growth of the Cocoa Palm (*Cocos nucifera*), with its constant presence of blossoms and fruit. We were permitted to see this fine tree in all stages of its growth, first as a germinating nut with its fronds of green leaves bursting through its husky envelope; then as a young tree not so tall but that I might pluck the fruit from the ground, and maturer trees, from forty to forty-five feet in height, that would require the dexterity of an agile boy or monkey to climb to seek the fruit. The trunk of the cocoa palm is from six to ten inches through; it is endogenous, growing at the end of the stem and, therefore, has all of its foliage at the extremity of the trunk. Every month a new leaf or spathe expands itself from the fibrous integument in which it is enfolded and discloses a spadix of bloom and so it happens that there is always to be seen, on a healthy and growing specimen of this species, the blossom, below this the small nuts, the size of walnuts; beneath them a cluster of from six to ten larger ones the size of the fist; and below these the ripening nuts, each hanging by a slender stem, not so large as a lead pencil. It is claimed, I cannot say how truly, that from a thrifty tree one may pick a ripened cocoa-nut every day in the year. The planting of this picturesque tree is so simple a matter as the excavation of a shallow hole in the sand and placing therein a sprouted nut, covering it and leaving it to care for itself. If at a distance from the salt water, it is the custom to place a quart of coarse salt in the hole with the nut, as the tree is said to be partial to the salt water and grows with the greatest freedom near to the seashore. It fruits at the age of four years.

Another remarkable and striking tree is the silk-cotton tree, *Bombax Ceiba*, which, when a young tree, has a clear, round trunk of a gray color but thickly covered with stout spines or thorns projecting from one-fourth to three-fourths of an inch. At this stage of its growth it is called the monkey teaser as it must greatly perplex the monkey tribe to climb its prickly trunk in a hurry and not get badly scratched. As the tree increases in size it throws out huge buttresses around the base of its stem, as if to brace itself for the terrible tempests which sooner or later it must encounter. The largest tree of this species is in the rear of the Public Building on Bay Street at the corner of Parliament Street.



Bombax Ceiba Tree.

Royal African Palm.

It is fifty or sixty feet in height and is a medium-sized tree. The spread of its limbs is about one hundred and twenty feet in one direction by about ninety in the other and its buttresses project in a helical manner fully fifteen feet from the base of the main trunk. It is a native of South America, deciduous, and bears an exuberance of long pods filled with a silky fibre, whence comes its name, and it is a favorite custom with visitors to have themselves photographed among its spreading buttresses, as a souvenir of their visit. The native colored people of the West Indies are very superstitious concerning this tree and think not only that the goblins sport in its branches by night, but that any indignity shown to it, such as the casting of stones at it, will be certainly resented by some calamity, as sickness or death, being visited upon the family or friends of the offender.

Some stately specimens of the African Palm, called in Nassau the Royal Palm, are to be seen with their smooth, swelling trunks, having a gray, stony appearance as if turned in a lathe out of stone, and of a great height. The upper portion of the trunk is smaller in diameter, smooth, and green, generally with an abortive attempt at the production of fruit hanging withered just below the feathery foliage which crowns the summit of the tree.

The Leguminosæ — the great family of pod-bearing trees, of which the acacia is the type — are common and striking objects in the streets, parks and private grounds. The pods are of all kinds and colors from bright, golden yellow to jet black; some are small and light, others large and heavy enough to serve as formidable weapons and require much force to tear them open. Of this kind is the Poinciana tree. The Tamarind (*Tamarindus occidentalis*) is also of this family; it is not so fine in fruit as the *T. Indica*, which has a large pod with a fine pulp, but nevertheless a tolerable preserve is made by packing in layers of sugar the pulp extracted from the pods. It has a pleasant acid flavor and makes a grateful, cooling and nutritious drink in sickness.

Orange trees are quite abundant and the fruit is excellent and cheap, the highest price being one dollar per hundred at Nassau, while at other places on the out-islands it was to be obtained for fifty cents per hundred and in some instances was to be had for the asking,— nice, luscious fruit. Limes were common, fine and cheap. They were obtained for twenty-five cents per half-peck.

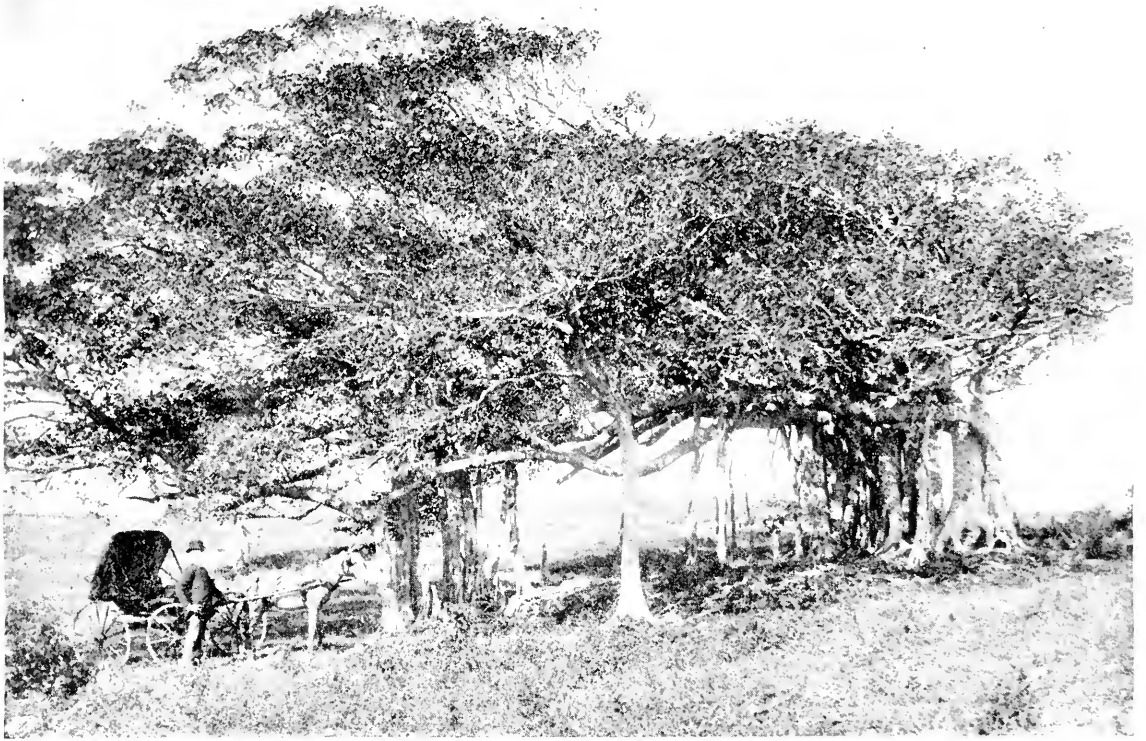
The Sapodilla is a striking and interesting tree to the New Englander, being when full grown, large and of fine shape, something like a well-pruned pear tree, and when loaded with its large, russet-colored, ovate-shaped fruit, is very ornamental. The fruit has a soft, pulpy flesh with a sweetish taste, described by those who are fond of it as being like sugared honey.

Of the so-called Cabbage Palms there are several fine types to be seen. This tree receives its name from the use that is made of the young and succulent leaves which form a head and sometimes also of the terminal bud, which are cooked and eaten as a salad. Whether these trees were the *Areca oleracea*, a true palm, or the *Sabal Palmetto* which is a similar tree and used for a similar purpose, I was not botanist enough to determine nor did I find anyone who was. However, as the palmetto is a common tree and the *Sabal serrulata* or Saw Palmetto is universally found in the thickets or scrub, as it is called, very probably the so-called palm is merely a palmetto.

Time will not permit the enumeration of all of these interesting forms of vegetable life, but I will allude, in passing, to the India rubber tree, the *Siphonia Cahuchu* of South America, of which there are fine specimens to be seen. It is, of course, an exotic, but thrives and might doubtless be easily propagated. Its kindred tree, the *Ficus elastica*, which is a source of the elastic gum in the east, is a sort of connecting link between the Cahuchu and the wild fig which is indigenous to the Bahamas, and has the habit peculiar to the oriental Banyan tree, *Ficus Indica*, of throwing down shoots from its branches, which upon reaching the earth take root and form additional supports for its spreading top. A fine specimen of this tree stands near the highway, a short distance to the eastward from the centre of the town, and is commonly called the Banyan tree, although there has always been a controversy as to its identity with the true East Indian Banyan.

In order to understand or appreciate the agriculture of these islands one must know something of the peculiar formation, texture, and condition of the soil. The underlying rock throughout the Bahama Islands is a coralline limestone. This is formed of the comminuted fragments of coral and shells, torn to pieces and worn by the ceaseless agitation of the ocean, thrown up into ridges twelve and fifteen feet in height and intermingled with enormous masses of algæ torn from the ocean's bed by the tempest; blown

POINCIANA REGIA (Flamboyant Tree).



Banyan Tree.

by the trade-winds into sand dunes thirty and forty feet in height, to be crested and covered with a profusion of trailing leguminous plants, notably the *Batatas littoralis*, with various grasses and shrubs, among which the scrubby Palmetto (*Sabal serrulata*) is common. These all serve to retain the sands in place, prevent their shifting, and arrest new deposits through which they continue to grow with surprising luxuriance. These great sand dunes in time become indurated by the continued action of the rains from the well-known effect of the carbonic acid, prevalent in rain water, which cements the grains of oölitic sand into a dense and even crystalline limestone rock.

These masses of algæ, as well as the foliage and stems of the shrubs, decompose in the places where the sands have buried them, the result being that the solid and compact oölitic rock is penetrated through and through with apertures, channels, crannies and cavities that are filled with decomposed vegetable matter, so that while to the uninformed eye the surface of the ground may seem as bare and hopeless of sustaining vegetable life as are the tops of our Quincy ledges, the fact is that one has but to break a hole into the surface of the rock, put in a little soil which may be scraped together, insert the seeds or plants and leave them to their own devices, with the certainty that they will germinate and thrive, pushing their roots out and around into these various interstices that have been filled, by the processes of nature, with just the kind of material best suited for their sustenance and growth. In most fields that have not been artificially prepared, the natural surface covering of soil is but slight, and in some that I saw the surface seemed to be nothing but honey-combed rock, entirely destitute of soil, and yet it was covered with a vigorous growth of shrubs and trees. Upon such ground there is no chance to use either spade or plough, neither do you see them in use anywhere, the principal and most effective implements of husbandry being the crowbar, pickaxe and sledge-hammer.

To make a fruitful vegetable garden all that is required is to pulverize the surface of the limestone rock, which becomes mingled with what vegetable matter there is, while more is speedily added from the rank growth of vegetation which invariably follows, and a good friable soil of sufficient depth is the result. Thus it is apparent that land which would well sustain a thrifty growth of trees and shrubs would not, by any means, answer for a vegetable

garden; but by the expenditure of time and strength one may be prepared in the manner indicated, at the rate of about two square rods for a day's work, and at fifty cents per day, which is the prevailing rate for wages, the cost of the thorough preparation of the soil for the highest culture would be about $40 per acre.

Owing to the facility with which this limestone rock is quarried, it is cut out in square blocks and the floor of the quarry is easily left with a fair surface and but little unevenness. This, of course, is covered with the pulverized rock and débris — the result of working the stone — which soon forms a mellow soil that is readily put into the finest condition for the orchard or the garden, so that in some of these worked-out quarries can be found a luxuriant growth of fruits and vegetables. In such situations the growth of vegetable life may be made perennial. One can supply the table every day in the year with every desirable vegetable, but it would be essential to constantly renew the supply of seeds from the north, owing to the natural tendency to deterioration, the inferiority of the vegetables seen in the market, compared with those of the same sorts to which we are accustomed at home, being quite noticeable.

This market was a study and a revelation. It is well situated on the main street and extends to the harbor. The stalls are put up at public auction at intervals of three months, and the renter may sell everything except hardware, crockery, dry goods and liquors.

Outside of the market, around the passageways and on the wharf, persons, mostly women, are allowed the privilege of selling poultry, crabs and vegetables upon the payment of sixpence per day — about twelve cents. These people will walk in a mile and a half or two miles from Grant's Town, which is peculiarly the negro community, at a very early hour of the morning bringing their little stock of vegetables in a basket borne upon the head. On arriving at their allotted space at the market, they spread their goods upon a box, a board, or the head of a barrel. A few potatoes or yams, onions, tomatoes, martynias — a few beans, beets, turnips, radishes, or some little sticks of sugar-cane — are grouped together in small lots to the value of a ha'-penny, a penny or a check, which is a penny and a half. One parcel that was noticed particularly, consisted simply of one small tomato and half an onion and was valued at a ha'-penny. The purchaser, generally a negro, lays down the coin, sweeps the allotted portion into the basket without uttering a word, and passes on.

St. Agnes' Church, Grantstown.

Outside the market, on the sidewalk, will be a line of men and boys sitting upon the curbstone, each with a bundle or two of fodder or a few faggots of firewood deposited in the gutter. Horses are not common on any of the islands, the customary beast of burden being a diminutive mule or donkey. It did not seem as though the sales of these people could average more than two or three shillings per day, which would indicate the putting forth of considerable effort for rather meagre returns.

Here it may be fitting to give the results of some observations on the labor problem as viewed in Nassau. The price of wages for an able-bodied man is fifty cents per day, women receiving less, — barely half. It is not correct to represent these people as being averse to labor, as is sometimes done without reflection. They seemed to be as willing to work as anybody else. It has been only in rare instances that any people have been observed to labor for the enjoyment it gave them. A gentleman, largely concerned in the canning of pineapples, gave the assurance that when his hands once thoroughly understood what he desired of them and the way it was to be performed, he had no difficulty whatever in obtaining regular and willing service which was fairly satisfactory. They seemed ready and anxious to please and would linger around the premises when their stint was performed. As the work in this case proceeded by stages some had to begin earlier than others, who of course wrought later to finish up, but all seemed eager to work and contented when busy. The day's stint for a woman was the paring of one thousand pineapples for which she received thirty cents. Any person who voluntarily assumes such a contract cannot be said to be averse to labor.

It was a part of the programme of excursion to spend two or three weeks cruising among the islands and visiting some of the outlying settlements. A complete camping outfit, even to tent-pins and frying-pan, was taken from home; stores were procured in New York — 600 lbs. of them; a circular letter was thoughtfully provided by His Excellency Governor Shea, which ensured a cordial welcome from the magistrate at every settlement visited. A sloop of about ten tons, the Sophia Maud, was secured, with a white conch for skipper and a black conch for pilot and cook, stores were transferred from the custom-house warehouse, the water cask was filled, and the expedition sailed.

It is not proposed to follow the haps and mishaps of this unique cruise, but simply to introduce a few of the observations which it afforded to illustrate our present topic. The first landing was made at Current, a small settlement on the northerly end of the island of Eleuthera. Here was found a people truly Arcadian in simplicity. In a population of four or five hundred not more than one-tenth were pure white and there were all shades of color, from the Caucasian to the darkest African, of a race so pure that they still cling to the native African hut with its wattled, mud-plastered walls and are as shy and coy as partridges. None but women, children and aged men were found at home, the able-bodied men being away sponge fishing, either among the Cays or at Key West, where there is more profit to be obtained. The best house in the settlement was a modern looking dwelling built of wood, new, comfortable, and with glazed windows, which were the only ones in the settlement. It belonged to a young white man who had built it at the cost of about $750, married a proper wife, and then returned to his sponge fishing. This matter of glazed windows is more important than would appear until it is understood that all houses, great or small, furnished with glazed windows are taxed five dollars per year. Owing to the extreme salubrity of the climate the windows of most houses in the settlement and those of the negroes in Nassau, are only closed at night or during violent tempests, which sometimes rage, and then with wooden shutters or blinds.

There was neither almshouse nor pauper, lock-up nor tramp, court nor criminal, but there was a clean white stone chapel and a school-house filled with bright looking children. Highways there were, ample and grass-grown, but no horses or carriages; cocoa-nut and orange trees in abundance but no commerce, manufactures, or trade. This was the counterpart of some of the old towns on our own cape where fisherman and sailor simply dwell.

Harbor Island, which has a mixed population of about two thousand, is a picturesque spot, to the east of Eleuthera, enclosing an excellent harbor between its shores, and there was more activity in the way of ship and boat building. Upon the substantial stone pier was a shipment of tomatoes ready to load for Nassau and New York. This industry of supplying tomatoes for the winter market in the north has languished of late years, partly from the uncertainty of connecting with the steamer at Nassau, but more particularly from the failure of the growers to maintain the relative excellence

NATIVE HUT, GRANTSTOWN.

A Pineapple Field.

of their product and from their persisting in sending the same qualities and varieties which they shipped twelve and fifteen years ago, all unconscious of the fact that during that time there has been a marked improvement in the quality of the varieties cultivated — so much so that the best of former times are discarded; and also of another important fact that, owing to the great progress in the winter culture of the tomato at the north, the consumer has become more exacting as to the ripeness of this vegetable and rejects those that are packed green to ripen in the crate during transportation.

The pineapple is pretty generally grown in this district, but some peculiarity in the tenure of the land, which is more or less held in common instead of in severalty, has served to discourage cultivation, men being unwilling to assume the risk and responsibility of a plantation where they do not possess the individual ownership of the soil. This would seem to be an object lesson in the social problem that is now discussed and would indicate that these people are not sufficiently trained in sociology to appreciate the advantages of communism, nor so far advanced as to look backward.

At Governor's Harbor was found a thriving settlement of perhaps fourteen hundred people with about one-tenth white. The bulk of the population is concentrated in a rocky cay, of about three hundred yards in length and one hundred yards in width, which is joined to the main island by a sandy beach, forming the harbor. Here the culture of the pineapple is conducted under the best auspices; the lands are owned by the planters and every effort is made by them to improve the quality and increase the quantity of their crop. Of the lands in these islands only on those having a red soil will the pineapple grow with the greatest success, although it may be grown of an indifferent quality on the gray soil, which is more common. This red earth owes its color primarily to the iron in its composition, and its greater fertility to the decayed algæ which were thrown up by the sea in those remote cycles when these islands were forming. This decomposed vegetable matter is rich in potash and is found in holes and pockets, crannies and caves in the rock all through the islands and under the name of cave earth, it is sought after and applied to add fertility to the soil. Thus a limit is placed upon the area of land which is most desirable for the cultivation of the pineapple and good available land is correspondingly appreciated, selling readily at from eighty to one hundred dollars per acre.

There were exported from Governor's Harbor and Tarpum Bay, two adjacent districts, in 1890, 295,345 dozens of pineapples for which was received £23,000, or $115,000. In addition to these there were consumed in a canning factory 22,000 dozen, which were returned at a value of $2,500, but which were probably more nearly worth, and doubtless realized, more than $6,000 for the pineapples, aside from the expense of packing. These were all exported to Baltimore and New York.

The red or Cuban variety is the one mostly cultivated, it being much preferred for quality and size. The plants are propagated by offsets or suckers, taken from the older plants after the fruit is cut. They are set out in August and sometimes bear the next year, but a full crop is not obtained until eighteen months after planting. The cutting season begins in May and from that time until the harvest is ended is the active season of the year with the gathering, packing and shipping of the fruit. The fields are not immediately contiguous to the settlement but are planted up and down the island, where the soil is propitious. Many of them are several miles away and the field hands go to and from their work in small cat-boats, thirty-five of which were counted in Governor's Harbor one morning. They go out with the dawn and return at sundown. The plants grow so thickly that, after the first year, but little cultivation is required and their serrated leaves form a prickly thicket that it was found impossible to penetrate, without injury to person or clothing, and yet the negro field-hands, with a better understanding of how to do it, would easily pass through it barefooted, without harm or difficulty.

The crop will vary greatly being from eight hundred to fifteen hundred dozen per acre. It has been doubled in recent years by the use of commercial fertilizers especially prepared for this crop, of which a thousand barrels were used in 1890 in the district of Governor's Harbor, costing about seven dollars and a half per barrel. Formerly it was the practice to plant a field and crop it for three or four years and then, as the soil became exhausted, let it come up to scrub and after laying fallow, as it were, for ten or twelve years clear it up and go through the routine again. Now, however, under the present use of fertilizers, the soil does not become impoverished and the plantations can be renewed for a much longer time, and so far none have been allowed to return to the wild state.

Capt. H. C. Lightbourn's Sisal Plantation.

A new and apparently a prosperous industry seems in a fair way of being created in the cultivation of Sisal hemp, which, if it proves as successful as it now bids fair to be, will afford a certain and remunerative employment for large numbers of willing hands that can now find employment for not more than half the time.

What is known as the Sisal fibre of commerce is the product of the "Henequen" plant of Yucatan, which was introduced into Florida as the *Agave Sisalana*, but is probably the *Agave Americana*. The plant which produces a similar but better quality of fibre in the Bahamas is there called the Pita plant. It is an Agave growing to the height of six feet, with stout, fleshy, pale green leaves, smooth upon the edges, with the characteristic stout thorn upon the end; it is entirely different from the Sisal or the Cuban fibre-plant, the Sanseviera.

The Pita plant is indigenous to all the islands and has hitherto been noted as a prevalent, obnoxious, and persistent weed which grew anywhere, with or without encouragement, even on the tops of old walls and, when once established, dominated and crowded out all other plants. These are exceedingly desirable qualities, as most useful plants require care and constant cultivation to preserve them from the encroachment of others that are useless or noxious.

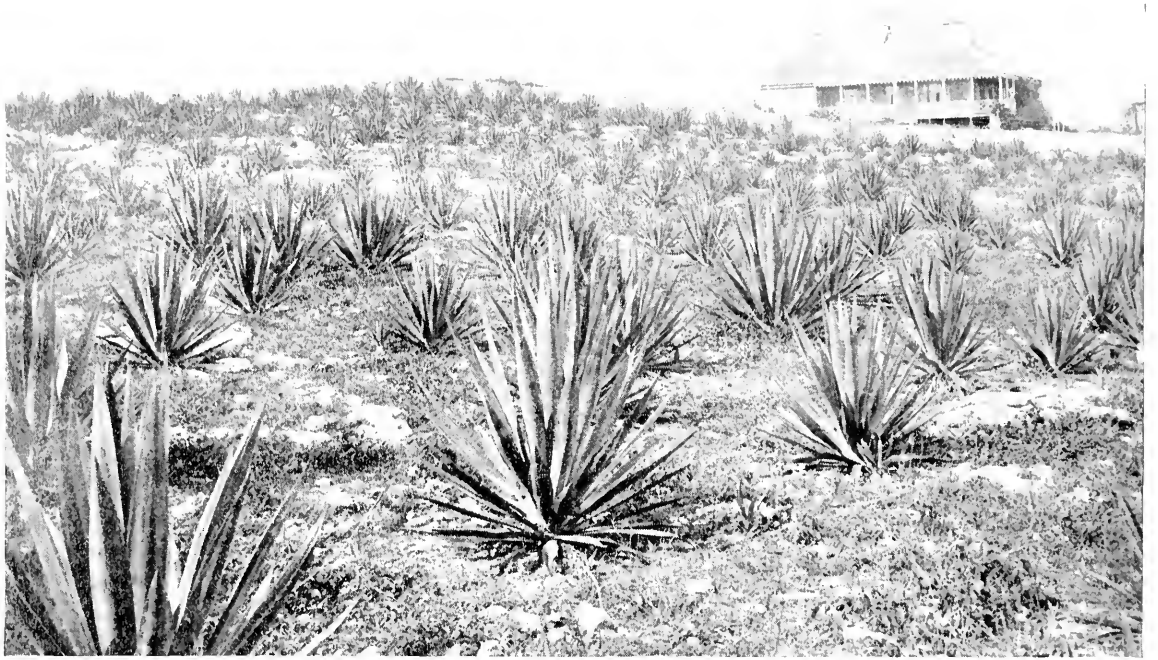
Individuals and stock companies have entered with much enthusiasm and apparent success upon the cultivation of this plant, and there are now 4,200 acres in growing plantations stocked with 2,633,000 plants, with 1,330,000 plants in reserve in nurseries. The plantations brought more particularly to my attention were those of the Munro Fibre Co., Abaco, with 1,100 acres at Green Turtle Cay and 200 more on the Island of New Providence, planted with 750,000 plants and 300,000 more in the nurseries; and that of Mr. D. D. Sargent, at Inagua, with nearly 200 acres planted with more than 100,000 plants and as many more in nurseries, with several hundred acres in preparation for planting. Capt. H. C. Lightbourn, of Nassau, has a fine plantation of several hundred acres, having cocoa-nut trees mingled with his Pita plants. He has probably 250,000 growing plants and is successfully producing an excellent quality of fibre.

The next season's crop in the Bahamas should exceed 2,500 tons, when it will be demonstrated whether the culture is to be commercially successful.

The plants are set at from six feet by six feet, to ten feet by ten feet, according to the caprice or understanding of the cultivator. Six feet appears to be too near for the perfect development of the mature leaves, to say nothing of the requirement of sufficient space for passage between the plants, without interference or injury. About eight feet by ten feet appears to be a satisfactory compromise and will afford room for five hundred plants per acre. With the exception of weeding and reducing the lateral shoots and suckers during the first year, little care or culture is required.

Recorded experience is not yet sufficient to enable one to form a correct judgment as to the bearing life of the plant or its maximum product, but it seems to be pretty generally conceded that under ordinary circumstances the plants are in a mature and bearing condition at from four to five years of age; that about forty leaves can be cut from each plant annually, weighing about sixty pounds; that it is better for the plant, as well as the crop, to make the cutting at intervals of three or four months than to make it once a year, as the leaves thus obtained will be taken at full maturity and are not so liable to be over-ripe and comparatively worthless. When the leaves assume a position horizontal to the trunk they are sufficiently mature to cut, and if taken either before or after are of diminished value. When cut, the leaves are tied into bundles and taken to the machine, which is simple and easily operated, and are passed, one by one, through it. They are crushed and the fibre is stripped of the pulp which constitutes fully ninety-five per cent of the weight of the leaf. From eight hundred to one thousand pounds of fibre can be obtained from each acre at a cost, including cultivation, cutting, stripping, and drying, of about three cents per pound.

These plants are very tenacious of life and one has been known to grow nicely after having been kept dry in a tight box for eighteen months. When the plant arrives at its full maturity it has a tendency to run up a flower stalk called a "pole," which grows from sixteen to eighteen feet high with a diameter at the base of from five to seven inches and bears, instead of blossoms, as many as one thousand young plants, perfectly formed and ready to maintain an independent existence. This occurs probably when the plant is from ten to thirteen years old, according to the luxuriance of its growth, but, singular as it may seem, although this plant is indigenous all over these islands and the natives have



A Sisal Plantation.

Sponge Trimmers.

been familiar with it all their lives, yet no one seems to know definitely what is the average life of the plant or whether that term can be prolonged by cutting out the stalk or pole, and preventing its growth.

The colonial government no longer makes large grants to companies, as it has hitherto done at reasonable prices. It is thought that enough has been done by such grants to encourage the development of the industry and demonstrate the practicability of the cultivation in a comprehensive manner. If permanently successful it will be deemed wise to sell the remaining suitable lands in small fields of ten acres, or thereabouts, to individual owners, that the people of small means, or even of no accumulations whatever, may be able to obtain their own individual holdings and produce their own crop instead of working exclusively for wages for others. This they may secure at one dollar per acre, to be paid out of the first crop raised, and it is hoped that by this method of sale a large portion of the laboring people who now obtain employment but a moiety of the time, at indifferent wages, may be induced to capitalize their lost time and thus soon become independent and self-sustaining.

The sponge fishery was an exceedingly interesting study. Probably four thousand of the islanders are engaged in gathering and curing the sponge. It is not the most attractive calling by any means. The sponges are fished from the bottom of the sea, sometimes in thirty-five and forty feet of water, either by the aid of long poles or by diving. Being secured they must be allowed to decay and then be freed from the resulting offensive animal matter, by thorough washing and drying. They are then brought to Nassau and exposed for sale at auction in a large open shed, called the Sponge Exchange, where they are sold to the highest bidder, he being a broker. No one can bid but a broker and sponges cannot be sold elsewhere than at the Sponge Exchange, so that this guild of brokers appears to have pretty much of a monopoly of the sponge business of the Bahamas. The proceeds of the sale are divided between the owners of the vessel, who are generally the outfitters, and the crew. Great complaint is made, and to an outsider it would appear to be with some reason, that between the outfitters and the brokers but little remains for the crew who perform this unpleasant and laborious toil, for they can hardly earn seventy-five dollars per year besides a very poor

fare. The outfit of provisions cannot be very extensive, for, while the Sophia Maud was lying under the lee of Pelican Cay, several sponging vessels also came into the little harbor for shelter and anchored. By the morning of the second day it was judged that provisions had run short among them, for the boats were out and they were making a lively hunt for conchs for dinner. Two men in each boat, stripped to the pelt, both ready to dive on the instant, sculled easily about, peering down into the water with a water glass made of a long box, eight inches square and twelve inches long, with a glass bottom. With this they could see the shell-fish in quite deep water and to see one was to dive for it. A civilized man is in pretty great straits for food when his appetite will enable him to feast on the flesh of the conch, *Strombus Gigas*.

The cruise of the Sophia Maud had a most auspicious termination. The interior waters among the islands form delightful cruising grounds, where one may generally look for a fair wind and make a safe anchorage every night. The last two days of the trip proved to be the only calm weather of the entire cruise; there was barely air enough to move the yacht along; the water was smooth as glass and the bottom of the ocean could be seen, at the depth of seventy feet, as clearly as if nothing intervened. The wonderful transparency of the water was difficult to understand and impossible to explain. The sun shone with great brilliancy, the atmosphere was clear and bright, and when the shadow of the great mainsail was thrown upon the surface, the water seemed to disappear as if the little vessel was by some mysterious means borne or hung suspended in the air. On the bottom could be clearly seen the different mollusks moving slowly about, the periwinkle as well as the conch; the varied and beautiful forms of coral, and the sea-plumes of all shades of color, waving gently in the current.

Fishes of all sizes and colors were swimming lazily around; the sand-fish, about the size and appearance of a good robust chub, shy and timid fellows, on being startled would bury their noses in the sand and waving their tails slowly to and fro seemed to simulate the motion of the sea-plumes about them; the barracouda, a species of shark, lying stationary thirty or forty feet away, like a clipper-built pirate as he is, waiting for his prey, seemed to ask what we were there for and what we proposed to do; the turbot with its varied colors of yellow, green, and blue, a nice fish for pan

or chowder; the blue fish, true to its name, of a bright ultramarine blue, with pink spots about its head, as it swims deep down in the water, seems to have a halo of color all about it and declines your most insinuating piscatory art. The trumpet fish, angel fish, mutton fish, parrot fish, swell fish, and a multitude of others of which there is neither time nor opportunity to learn the names, of all colors, shapes, and sizes swim lazily beneath you or sport among the mazes of marine plants with which the floor of the sea is covered. These days seemed like one continuous dream, so strange, so varied and unreal were all of our experiences both in the air and water.

As we leave these isles of summer the conclusion is inevitably forced upon us that the practical hand which is now directing their concerns will at no distant day secure for them a good and increasing measure of prosperity, which feeling seems also to impress the reflecting business men of the colony; that the native negro population possesses the same desires for accumulation that distinguish the most favored people of the world, and that when the way is shown them to utilize their industry they will eagerly pursue it; that they are as sober, orderly, and peaceable as those in other communities will average, not excepting the new New England; that the native white population are intelligent, courteous, and as enterprising as we could expect from their surroundings. They realize fully today that the flush times of blockade running during the American Civil War, were but a delirium of prodigality which has been followed by years of exhaustion and prostration. There seem to be better and more prosperous days at hand, which, let us hope will be more substantial and enduring.

Col. Wilson's lecture was illustrated by a large number of photographs, some of which, through the kindness of Mr. James H. Stark, in whose company Col. Wilson's journey was made, and who has freely given to the Society the use of the plates from his recent work on the Bahamas, are reproduced here, and also by specimens of the Sisal hemp. The lecture was received with applause, and at the close a vote of thanks to him was unanimously passed. A vote of thanks was also passed to the Committee on Publication and Discussion for the exceedingly interesting series of meetings which they had provided, of which this was the last.

The Committee on Publication have much pleasure in adding to the Transactions the following paper, kindly offered to the Society by the author:

Notes on the Fungus Causing Damping Off, and Other Allied Forms.

By Thomas Walton Galloway, Marshall, Mo.

I. Damping Off.—The damping off fungus has been known for a number of years through its disastrous effects upon seedlings. The peculiarities of the disease and the approved methods of treating it have been described by several contributors—gardeners and botanists—in the "American Garden," June, 1890. A more extended account is to be found in "Diseases of Plants," by H. Marshall Ward. In these papers various opinions are given with regard to the probable botanical character of the plant or plants causing the malady, some of the writers regarding it not as the work of a parasite but as the direct result of certain conditions of moisture and temperature; others deeming that the disease is caused by a growth of algæ about the subterranean portion of the plant, resulting in a suspension of the functions of the roots, and a consequent destruction of the seedling.

Notwithstanding the frequency of its occurrence in greenhouses and plant beds where seedlings are grown, there is the greatest latitude among gardeners concerning the application of the term. Many apply it to any conspicuous mycelium which may grow over the sand and weaker seedlings, without any reference to the effect produced by it. Others use the term in a much more restricted sense, distinguishing by it certain manifestations of disease on the part of the seedling, rather than any external fungous growth. This is the interpretation given by the most careful gardeners with whom I have talked, and is the one which I shall adopt in my study of the disease.

The behavior of seedlings suffering from an attack of damping off presents the advantage of being very characteristic, and when once seen may always be recognized. Its first appearance is indicated by a slight paleness and drooping of the seedlings. If these be carefully removed, it will be seen that the root, either throughout its length or in portions, is beginning to shrink and

decay, and that the root-hairs are destroyed. Later, if the plant is not vigorous enough to resist the fungus and to put forth secondary roots, the disorganization of tissue extends to the stem, resulting ultimately in the toppling over of the plant and its thorough decay, although in some instances the plant remains green for several days after falling. This extends from one plant to another until only a few or none of the seedlings in a bed may be left. From the nature of the growth and method of attack of the parasite, it will be seen that it is naturally more fatal to delicate seedlings and those which get their growth slowly than to others. Such plants as Gilia, Viscaria, Lobelia, etc., are much more likely to be injured than more robust forms. The conditions which are most favorable to its growth are moist atmosphere, high temperature, with shade, or cloudy weather.

At the suggestion of Professor W. G. Farlow, upon the appearance of the disease at the Botanic Garden of Harvard College, I undertook to ascertain the exact botanical character of the cause, or causes, of damping off. I soon became convinced that the conjecture which had been offered,—that a Pythium was the real parasite,—was correct. The features above given being accepted as characteristic of the malady, many seedlings so affected were examined. The tissues of such plants, especially in the roots and in the stem just above the surface of the ground, are readily seen to be permeated by the hyphæ and reproductive bodies of a species of Pythium. The same fungus was found in considerable abundance running over the sand, and in the dead leaves of Sphagnum which covered portions of the bed. I collected some of the Pythium from the moss and sand,—because there it could be obtained more free from bacteria and hyphomycetes than in the tissues of the living plant,—and sowed it upon tender bits of plant tissue placed in Van Tieghem cells, in a hanging-drop culture. By transplanting from cell to cell, I secured Pythium as free as possible from other forms of fungi. This, while growing freely and under the most favorable artificial conditions which could be secured, was sown upon seedlings of *Gilia tricolor* which had been germinated and grown in sterilized earth, and which had shown no signs of damping off. Within five days after the addition of the Pythium, seventeen plants out of twenty-three had been attacked by it, and fourteen of these

finally succumbed, and were wholly destroyed. The three remaining ones were removed before this occurred, to furnish comparison with the more advanced cases. Similarly, seeds were germinated in a pot of sterilized soil, without being artificially infected. These, subjected as nearly as possible to the same external conditions, did not show any signs of the malady.

The fungus, according to my observation, always attacks the plant through its roots. The hyphæ penetrate into and between the cells of the root, causing a complete breaking down of the tissues. In an advanced case of the disease it is almost impossible to make out any cellular structure in the lower part of the stem and root. The dissolution of the cellulose cell wall before the advancing hyphæ is very rapid. The root-hairs and sub-epidermal growing parts are first affected, the former drooping and becoming functionless even in regions not immediately attacked. The hyphæ extend into the stem, and in some instances I have found the mycelium densely matted in the tissues of the leaves, although this does not usually take place until the plant has fallen to the ground. The vegetative hyphæ grow with very great rapidity under favorable conditions. I placed within a Van Tieghem culture cell, a plant which showed only a few filaments in its roots; in eighteen hours it was thoroughly covered and penetrated by the hyphæ without having formed a single oögonium. Twelve hours later, owing, probably, to the exhaustion of the food supply and the removal of some of the moisture, oögonia appeared in great numbers in every part of the plant. This illustrates to what an extent the fungus may spread in a single night, and how quickly it responds to changes in the conditions of food, temperature, and moisture.

The hyphæ of the Pythium are much branched, and mostly unsegmented, except in regions where reproductive bodies occur; at such points one or more septa are formed. [Fig. 1.] They vary in diameter from $4\frac{1}{2}\mu$ to 6μ* when mature, and are usually dark with densely granular protoplasm. The walls are very thin in comparison with the lumen, making the hyphæ very fragile. The reproductive bodies are of two kinds,—the oögonia and antheridia, and the non-sexual zoösporangia. The oögonia are

* The Greek letter μ denotes the unit of microscopical measurement, one-thousandth of a millimeter, or about one twenty-five thousandth of an inch. [Ed.

formed chiefly as enlargements of the terminal portion of the lateral branches. Each of these is separated by a septum from the hypha supporting it. There are usually in each case two septa, cutting off two cells from the main branch. The terminal one of these becomes spherical and forms the oögonium; the proximal cell gives off a secondary branch which results in a single antheridium. [Figs. 1 and 2, *a*.] The oögonia, however, are not confined to this terminal position. It is frequently the case that a portion of the filament, anywhere along its length, becomes separated from the remainder by two septa, and becomes an oögonium. [Fig. 3.] The oögonia are 20–26μ in diameter. Each contains one oöspore which measures 16–20μ. The oöspores have two walls, (1) the exosporium, quite thick (2–2½μ), and (2) the endosporium, presenting only a single contour. In the early stages of the formation of the oöspore, spherules of protoplasm segregate in a manner very similar to the condition seen in the formation of zoöspores. [Fig. 2.] These masses are variable in size and number, and flow together again at a later stage. In addition to the oögonia and antheridia, there are other terminal swellings which are somewhat smaller (12–15μ), each of which forms a tube in a manner entirely similar to that described by Hesse and others as the commencement of the formation of zoöspores. According to Hesse's description, the protoplasm of the sporangium passes through this tube into a thin-walled enlargement at the end, where the separation into zoöspores takes place. I regard the structures represented in Fig. 4 as being zoösporangia, although I have not succeeded as yet in procuring functional zoöspores from them. There are other enlargements of the hypha which must be considered purely vegetative. They are short portions of the filament which are cut off by two septa from the remainder, as in the case of the non-terminal oögonia; but they are not accompanied by antheridia. [Fig. 5.]

The oöspores germinate by the rupture of the thick exosporium and the protrusion of a tube from the endosporium. The extension of this tube results immediately in the normal hyphæ of the plant. [Fig. 6.]

The character and position of the zoösporangia, the monosporous oögonia, the measurements of oögonia and oöspores, and the very ramose mycelium seem to indicate that the plant is the

Pythium described by Hesse under the name *P. De Baryanum*. Saccardo gives as synonymous with it,

P. equiseti, Sadeb.

Lucidium pythioides. Lohde.

P. vexans, De By.

The destruction of the fungus may be effected very readily by subjecting the soil to conditions favorable for the germination of the oöspores before the time when it is desired for the reception of the seeds. If, in a few days, the soil be exposed thoroughly to a very dry, hot atmosphere, the very fragile vegetative hyphæ will be destroyed, and a practical sterilization of the soil will result. With proper subsequent care the likelihood of attack will be very much diminished. Several methods of treatment to be followed after the disease makes its appearance are given in the "American Garden," as cited above.

Since completing my observations on damping off, the notes of Professor Humphrey, of the Massachusetts Agricultural Experiment Station, have reached me. The two series of observation were independently made, and inasmuch as they agree lend mutual support.

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II. Saprolegnia monoica, Pringsheim.—It will perhaps not be inappropriate to include with my brief notes on Pythium the results of some observations on an allied genus, Saprolegnia.

In the Autumn of 1890 I made a collection of material from different localities in several states, with the purpose of securing species of Saprolegnia which would present the most favorable conditions for observing the nuclear action in the maturation of the reproductive bodies. Of the forms obtained, *S. monoica* seemed most suited to my use. The absence of thickenings on the wall of the oögonium, and the possibility of obtaining depauperate sporangia with only one or two oöspores make the observation of intrasporangial conditions more easy.

The nuclei of Saprolegnia are very small (1–1¼ μ), vascular, for the most part oval, and have a well marked nucleolus. They are usually so enveloped by granular protoplasm that their observation is a very difficult matter; this is especially true in the sporangia. The ordinary differential stains seem wholly inadequate to demonstrate them. The following treatment was the only one by which satisfactory results were secured. (1.) Fix with corrosive sublimate (satd. aq. sol.). (2.) Grade to 90% alcohol. (3.) Stain thirty minutes in dilute alcoholic solution of indulin (nigrosin), and rinse in 70% alcohol. (4.) Stain in Grenacher's alcoholic borax-carmine twelve hours or more. (5.) Mount in glycerine and acetic acid, or glycerine and alcohol.

This treatment very well differentiates the nuclei in the hyphæ and in the earlier stages of the oögonia. In the mycelium of the plant the protoplasm is arranged in a peripheral cylinder, from the inner surface of which extend projections into and across the central vascular region, forming a rather complicated net-work.

The nuclei are situated, for the most part, in these projections and at the crossings or enlargements of the protoplasmic strands. [Fig. 7.] In the young oögonium, one readily sees the persistence of the same general arrangement after the septum has been formed, the nuclei being clustered along the inner border of the dense protoplasmic investment. [Fig. 8.] In no case was I able to see their migration into the central vacuolar region, to the position occupied by the vacuoles with which Hartog considers them identical. This alone is not conclusive; but taken with the observations of Dangeard (Le Botaniste, April, 1890), with which my own accord in some degree, there seems to be ground for serious doubt concerning the accuracy of Hartog's interpretation. The nuclei are much smaller than the vacuoles are when they first appear, and are considerably more numerous. Dangeard further claims to have secured nuclei and vacuoles in the same preparation with sufficient clearness to preclude belief in their identity. In addition to this it must be noted that Hartog's idea, that the nuclei unite two by two to form the so-called vacuoles, which in turn unite until all the nucleine is contained in from two to four masses, which resolve and reunite to finally distribute nucleine to each of the oöspheres, is thoroughly at variance with what is known of the behavior of nuclei in general. Aside from the union of male and female pro-

nuclei, and the mingling of cell contents in conjugating forms — where sexuality is doubtful, we find nothing parallel to this commingling of nuclei, — and nowhere do we find it so thoroughly promiscuous, and succeeded by an almost equally indefinite separation and distribution of nucleine.

It is my purpose hereafter to continue more fully the study of the action of the nuclei in the formation of the oöspores.

While at work on Saprolegnia, my attention was especially drawn to what have been called resting zoösporangia. These present a moniliform series of enlargements at the free end of the hypha. [Figs. 9 and 10.] They are formed by from two to six repetitions of the process described by Rothert in his account of the formation of the simple zoösporangium. The hypha ceases to grow in length, while the protoplasmic contents continue to press toward the free end of the hypha. This results in a terminal enlargement. The protoplasm aggregates in this swelling and becomes densely granular. About the point where the hypha begins to enlarge, the dense protoplasm grades into the thinner sub-sporangial protoplasm. In this region a hyaloplasmic disc is formed by the withdrawal of the granules. From the basal portion of this disc a septum is produced, probably by material which is taken up and deposited by the "cellulin corpuscles" which Rothert states accompany the formation of the septum. In the meantime that portion of the hypha immediately below the septum begins to enlarge, passing through the same stages. This is repeated a variable number of times (from two to six), the zoösporangial swellings growing smaller proximally. Portions of the filament are not infrequently cut off without becoming enlarged at all. The protoplasm in these sporangia arranges itself as an investment of variable thickness about the periphery of the cell, with granular strands or sheets extending across the lumen, forming two or more vacuoles. This protoplasmic layer becomes finely granular and very dense, especially on its external aspect. The surface bordering the tube is much more coarsely granular, and contains nuclei. At this point the development is arrested, and the zoösporangium has the power of remaining quiescent for a considerable length of time without losing its vitality. In several instances growth was induced after more than a fortnight of rest. When stimulated to renewed activity by the addition of fresh nutriment they showed capability of developing

zoöspores [Fig. 11], or of giving off vegetative tubes which grow very rapidly. [Fig. 12.] In the former case the regular process of zoöspore formation seems to be taken up just where it was interrupted, passing through the "partial segregation" (spore-origin) stage, the "homogeneous" stage, and finally the protoplasm separating again,— this time permanently — forming zoöspores. When the tubes are formed instead, they may spring from any portion of the sporangium, usually one to each. The parietal protoplasm of the zoösporangium occupies a similar position in the germinal tube, the lumen of the latter being continuous with the cavity of the former. [Fig. 13.]

A physiological consideration of the resting zoösporangia is interesting in showing the conditions under which they are formed, and taken in connection with their structure may show their origin, use, and homology. In my cultures of *Saprolegnia monoica* I used mosquitoes as a substratum, as they were of convenient size and seemed to furnish sufficient nourishment for a complete generation of the fungus, without offering extra material to decay and attract bacteria. After getting cultures started I secured new ones by transferring escaping zoöspores only, thus being enabled to obtain, asexually, generation after generation of the plant. My observations in this particular do not accord with the statement of Hartog, that "on the whole it appears that cultures from successive generations of zoöspores tend to produce oöspores more readily." On the contrary, I found that, after ten or fifteen generations of zoösporic reproduction, there was a decided diminution in the number of oösporangia formed, as well as in the number of oöspores which they contained. In addition to this there was manifestly a tendency toward the disappearance of the antheridia even when oögonia were produced. Finally there was a total cessation in the production of oögonia, and only resting zoösporangia with two or three enlargements appeared. The disappearance of the oögonia and antheridia, and the decrease in the number of oöspores point to a deterioration of the fungus.

The formation of the resting sporangium at such a time must be interpreted as an attempt on the part of the plant to produce something of a reproductive nature longer-lived than the very transient zoöspores, after it becomes too degenerate to produce oöspores. Practically the same features were observed in experi-

menting with the supply of food. In cases where an amount of food was given which seemed inadequate to the needs of a complete generation of zoöspores and oöspores, very few of the normal zoösporangia and oögonia were formed, but the energy of the plant was directed toward the production of the resting sporangia. Thus it is evident that the insufficiency of food may directly prevent the appearance of oöspores. It is not impossible that the amount of the food supply and the prospect of immediate support — or the reverse — may at least regulate the formation of zoöspores as well.

When a new supply of nutriment is added to a culture which has developed resting sporangia, the manner of renewing growth depends somewhat upon the amount of nutriment added. If the nutriment be supplied gradually, as by the decay of another fly in close proximity, one finds that the tendency is to yield zoöspores by the normal method, whereas, if a sudden addition of food is made, as by a decoction of flies or flesh, the vegetative tubes are put forth in a manner essentially similar to the germination of an oöspore, and with a similar rejuvenescence of the resulting plant. These considerations lead me to conclude that the resting zoösporangia are intermediate in function and structure between the normal zoösporangium and the oögonium; and, taken in connection with their similarity of position, and the remarkable parallelism of the protoplasmic changes in the formation of their products, offer much reason for considering the three structures as really homologous.

In conclusion, I would express my thanks to Dr. W. G. Farlow for valuable suggestions and the use of his library.

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Explanation of Plates.

Plate I. *Pythium DeBaryanum*, Hesse.

Fig. 1. Hypha showing method of branching and young oögonia (*a*). ×700.

Fig. 2. Terminal oögonia. *a*, *b*, and *c*, progressive stages in formation of oöspore. *o*, oögonium. *p*, antheridium. ×1100.

Fig. 3. Non-terminal oögonium, with antheridium. ×1100.

Fig. 4. Stages in formation of zoösporangium. *e*, empty zoösporangium. ×580.

Fig. 5. Gemmæ. ×800.

Fig. 6. Germinating oöspores. ×1000.

Plate II. *Saprolegnia monoica*, Pringsheim.

Fig. 7. Hypha showing arrangement of protoplasm and nuclei. ×1500.

Fig. 8. Young oösporangium, with nuclei. ×1200.

Figs. 9 and 10. Stages in the formation of resting zoösporangia. *c*, vacuoles. ×250.

Fig. 11. Resting sporangium forming zoöspores after quiescence. ×250.

Figs. 12 and 13. Other resting sporangia putting forth germinal tubes after quiescence. ×250.

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