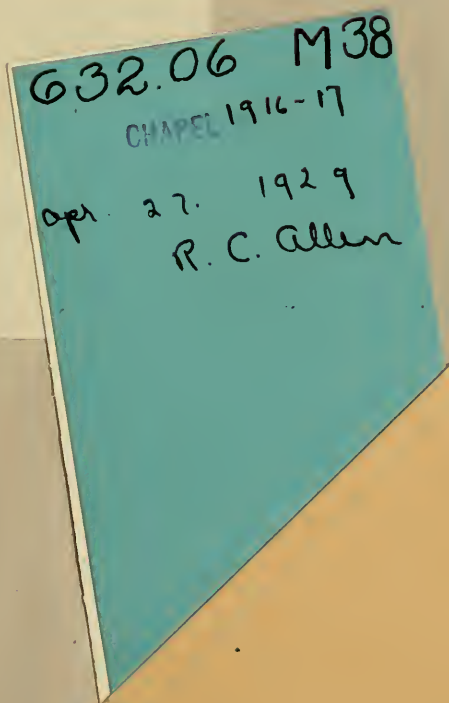

TRANSACTIONS

OF THE

Massachusetts Horticultural Society

FOR THE YEAR 1916

PART I

BOSTON
PRINTED FOR THE SOCIETY
NINETEEN HUNDRED AND SIXTEEN

Massachusetts Horticultural Society.

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Massachusetts Horticultural Society.

1916.

The Transactions of the Society are issued annually in two parts under the direction of the Committee on Lectures and Publications.

Communications relating to the objects of the Society, its publications, exhibitions, and membership, may be addressed to William P. Rich, Secretary, Horticultural Hall, No. 300 Massachusetts Avenue, Boston, Massachusetts.

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} *Committee on Lectures and Publications.*

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THE INAUGURAL MEETING, JANUARY 8, 1916.

TRANSACTIONS

OF THE

Massachusetts Horticultural Society.

1916, PART I.

INAUGURAL MEETING.

The Inaugural Meeting of the Massachusetts Horticultural Society for the year 1916 was held at Horticultural Hall, Boston, on Saturday, January 8, at eleven o'clock.

The call for the meeting was read by the Secretary and Mr. Farquhar, the retiring President, introduced the new President, Richard M. Saltonstall, who proceeded to give the following inaugural address:

Inaugural Address of President Saltonstall.

Ladies and Gentlemen,

Members of the Massachusetts Horticultural Society.

Our Society, incorporated as it was in 1829, is now about to enter upon the 87th year of its existence.

The traditions of the Society are such that it is a great honor to serve as the chief executive officer in the conduct of its affairs. Heretofore I have enjoyed the rather meagre opportunities to be of service to the Society as a Trustee, and at times as legal advisor, and I can assure you most sincerely that I appreciate deeply the responsibility of the office to which you have now elected me, and that I will give my earnest and best efforts to promote and carry forward the good work of the Society along the lines now so well established by my predecessors.

The work of Mr. Farquhar, my immediate predecessor, who has served our Society as President for the past three years, deserves the highest praise from us all. It is seldom that you find one who has such an extended scientific knowledge of horticulture in its fullest meaning, combined with long business experience and first class executive ability, and perhaps more important still, an acquaintance with all the best horticulturists, not only in this country, but in all quarters of the globe where there are any horticultural interests. Can any one who saw that wonderful field of Chinese Lilies (*Lilium regale*) in bloom last summer at Mr. Farquhar's place, fail to recognize his ability to propagate and introduce to lovers of flowers in this country the many attractive new varieties which have been recently brought to us from China and other far away parts of the world. Such have been the qualities of your late President, and I take great pleasure in extending to him the thanks of our Society and the earnest hope that he will continue for many years to participate with us in the conduct of its affairs.

Your Trustees have given careful thought at their meetings during the year to various matters of interest to the Society.

At the Annual Meeting a year ago, Mr. C. H. W. Foster, one of our well-known members, offered a resolution that the Trustees consider the expediency of making changes in our building which might result in a better commercial return from the property.

This property, as it stands on our books today, represents an investment of something over half a million dollars, $515,000.00, about $225,000.00 in land and about $290,000.00 in the building. A committee of your Trustees gave much time to this question of altering the building, and consulted with three very well-known architects. All of us must admire the dignified character of the exterior lines of our building, and to undertake to change these outside walls without obliterating the attractive architectural features, is almost an impossibility.

There is undoubtedly a quantity of interior space in the building which is largely wasted, but to render this space useful either for commercial use or for the use of our Society would require an expenditure of not less than $150,000.00, and some of the estimates ran up to nearly $200,000.00.

Our land is undoubtedly increasing in value as business is moving

up Huntington Avenue, and Massachusetts Avenue is fast becoming an important cross-town thoroughfare. Although the Society pays no city tax, our property is assessed and our land alone last year was assessed for $450,000.00.

The Committee and your Trustees unanimously feel that the wise course to pursue is to expend no further large sum on this building, but to wait until we can sell our present property without loss, and then move to some location where we can build anew. We have so informed Mr. Foster, who also considered the matter independently and are glad to find that he concurs in this decision. It is possible that some changes can be made in the walls of the large Hall which would be helpful in the artistic arrangement of our Shows.

The outdoor meetings conducted by Professor Jack at the Arnold Arboretum for the benefit of our members and their friends have proved to be quite popular. It certainly is a practical and attractive way of bringing to notice the many new varieties of flowering shrubs and trees at the Arboretum, and this work will be continued and extended from year to year if our members show by their attendance that it is appreciated.

Possibly it may become desirable to establish classes for instruction in the various branches of gardening, such as preparation of the soil, planting, propagating of plants by cuttings, pruning of shrubs and trees, demonstrations in the orchard of best methods for the care of fruit trees, and field meetings at noteworthy and successful commercial nurseries.

It is work of this kind along new lines from year to year that will keep alive the interest in our Society. We must not direct our efforts too much along beaten tracks, and any suggestion from members as to work to be undertaken will always be cordially considered by the Trustees.

The success of this Society in the future depends primarily, you may say, upon adhering to *good business principles* in the application of our funds, and the first business principle to apply is that we should live within our income. Our land, building, and contents are carried on our books at about $575,000.00; we certainly can be proud of our Library which is one of the very best of its kind in the world. It has at present about 25,000 volumes. In addition

to this property, which yields but a comparatively small income, we have invested funds amounting to $271,580.14, of which $61,463.61 are held for special purposes.

From our invested funds we receive an annual income of about $12,000.00 a year, $2,500.00 of which must be specially applied, and our income from all other sources which includes membership fees, use of building for exhibitions and other purposes, state aid, donations, and Mt. Auburn amounts to something over $9,000.00, or a total income of about $21,000.00; I regret to say that the Treasurer's figures when analyzed show that we are living beyond our income, or in other words, for the last four years have used part of our capital to pay running expenses.

In order to show more graphically what I mean, let us put the receipts and expenses for these past four years in parallel columns:

Year	*Receipts*	*Expenditures*	*Excess of Expenditures*
1912	23,049.55	23,795.29	745.74
1913	25,485.00	29,241.25	3,756.25
1914	21,157.42	23,971.87	2,814.45
1915	21,977.93	22,366.27	388.34
Total	$91,669.90	$99,374.68	$7,704.78

We all know that if we live on our capital instead of our income, we are certain to come to grief, and these figures indicate that in the last four years instead of adding something to our capital, we have diminished it by the amount of $7,704.78. If we had not used up this amount of capital, our annual income, figuring at 5%, should be about $380.00 more per year than it is at present.

It is too clear for argument that we must rectify this situation either by increasing our income or decreasing our expenses. I believe that there is opportunity by united effort to do both. We should get a better net return from our exhibitions.

In 1912 we received a net return from exhibitions of $3,099.62
" 1913 " " " " " " " " 1,116.42
" 1914 " " " " " " " " 689.25
" 1915 " " " " " " " " 2,097.22

These figures show a great variance in results. Why is it? Are our exhibitions fully advertised? Are they made to satisfy popular demand? These are questions which can be well considered with a view to swelling our treasury return from this natural source of revenue.

The membership of the Society should be larger. We should attract members from all over the State, and this would afford not only increased dues but added interest in the work of the Society. In 1914, the Trustees directed the Treasurer to apply $25.00 of each Life Membership fee to the Permanent Funds of the Society which is certainly right. At present we have 773 Life Members and 161 Annual Members. We should increase our membership by at least 100 a year. In 1871, this Society had a membership of 1035.

In 1914 the Trustees also directed the Treasurer to apply one-half the receipts from Mt. Auburn to the Permanent Funds. This certainly should be continued for the reason that the lands from which our Society receives a portion of the sale price are fast being sold and we should try to establish a fund from which the Society will get a return after these lands are all sold and revenue from this source ceases.

It is interesting to note at this time that the enterprise shown by this Society in purchasing in 1831, two years after its organization, the land at Mt. Auburn for the purpose of an experimental garden and rural cemetery, although it proved to be not practical from an operating standpoint, did, however, prove to be one of the most fortunate things our Society ever undertook from a financial standpoint, we having realized a constant revenue from the sales of the land since the property was turned over to the Proprietors of the Cemetery in 1835.

When one comes to consider the expenditures, it is hard to undertake to say where we can best make a saving. We must practice general economy hoping that by so doing we will in no way curtail good results. The annual expenditure for the Library seems to me small, as compared with other expenditures, and I mention this as it would not seem to me advisable to attempt to curtail on Library expense.

I believe we can reduce the amount appropriated for money

prizes at the Exhibitions by still further reducing the number of Large Exhibitions which last year were twelve in number, and which I submit might well be reduced to eight.

This matter of exhibitions has received much attention of the Trustees, and we are adopting a new policy for next year and for several years thereafter. You will remember that at the last annual meeting, the By Laws were so amended as to allow the awards and prizes to be fixed in advance for a longer period than one year; i. e., for not exceeding three years in advance.

The Trustees believe it advisable to have two annual exhibitions — one in the Spring and one in the Fall — on a larger scale than the other exhibits during the year; to do this, it will be necessary to offer larger prizes calling for exhibits which it may take the growers a longer period than a year to prepare for. It is expected that this can be done without increasing the expense to the Society by securing contributions from members and friends of the Society for the Special Prizes and from the larger returns which should be derived from such a Show.

The first large Show is to be held May 10–14, 1916, and I ask you all to bear this Show in mind, encourage exhibitors to send in their plants and encourage a large attendance. I am glad to be able to tell you that the $1525.00 required for the Special Prizes has all been paid in or subscribed for by members of our Society.

The interest of amateurs as well as that of professional or commercial gardeners must be considered constantly. It is largely due to the zeal and interest of our amateur members that our permanent funds have been increased from time to time by handsome bequests and donations.

It will add much interest to our Shows if we can encourage a wider field of exhibitors and will certainly add to the attractiveness of the Shows. The Trustees are proposing that every two weeks there shall be smaller shows at which no money prizes be awarded, but gratuities and certificates, and these shows should certainly appeal to the amateur growers. For many years during the early history of this Society, the weekly exhibits were most successful and apparently money prizes were not awarded. It is along these lines that we are proposing the fortnightly shows.

I earnestly hope that our Committee on Fruits will do all it can

to stimulate the waning interest in pear culture. Much has been said of late about apples, but I have noticed little, if anything, about pears. I believe there are only about three or four places in Boston where one can find for sale a variety of pears. Why is it so? Over in New York you find good pears in almost all the fruit stores, and they appear to be much sought after. I truly believe there is as much, if not more, money in raising good pears as in apples.

In reading the account of the Shows held during the first fifty years of our Society life, I was much impressed with the account of the fruit exhibits and especially of the pears; for example, at the fair held in 1871, Mr. Marshall P. Wilder was awarded a prize for 42 new varieties of pears. At our recent shows, I doubt if there have been 25 different varieties of pears exhibited. In the 1875 show, there were six hundred seventy-nine (679) dishes of pears and one hundred and seventy (170) of apples.

I look forward to the coming year with bright expectations for our Society and I ask the coöperation of our various committees and our active members to help in every way they can to make our Shows and our efforts in other directions successful in their results.

At the close of his address the President called for the annual reports of the officers and chairmen of committees which were given in the following order:

Report of the Treasurer, Walter Hunnewell.

Report of the Board of Trustees, by the Secretary.

Report of the Committee on Prizes and Exhibitions, James Wheeler, Chairman.

Report of the Committee on Plants and Flowers, T. D. Hatfield, Chairman.

Report of the Committee on Fruits, Edward B. Wilder, Chairman.

Report of the Committee on Vegetables, Duncan Finlayson, Chairman.

Report of the Committee on Gardens, John K. M. L. Farquhar, Chairman.

Report of the Committee on Children's Gardens, Henry S. Adams, Chairman.

Report of the Delegate to the State Board of Agriculture, Edward B. Wilder.

Report of the Committee on Lectures, Wilfrid Wheeler, Chairman.

Report of the Secretary and Librarian.

The reports as presented were severally accepted and referred to the Committee on Publications for record in the Transactions of the Society.

The matter of securing a larger attendance at the meetings of the Society was discussed by several members present and it was voted to request the Trustees to consider the subject and to see if something could not be done to increase the interest in these meetings.

The meeting was then dissolved.

William P. Rich,
Secretary.

HORTICULTURAL PAPERS.

FLOWERS AND GARDENS OF JAPAN.

By Ernest H. Wilson, Jamaica Plain, Mass.

Delivered before the Society, with one hundred stereopticon illustrations, January 8, 1916.

One may safely assert that no garden large or small in the United States of America is without its something "japonica." True, not all the plants bearing that name are strictly native of Japan for the ignorance of botanists and others has resulted in many plant names being misnomers, but that is another story.

To the horticulturists of this country Japan is of peculiar interest for not only has it furnished our gardens and our greenhouses with a host of invaluable plants but it is the only country of which the first fruits, horticulturally speaking, came direct to the United States of America. The gardens of this country secured the plants of most lands through Europe and not only exotic plants but a great number of North American native plants also. With Japanese plants the case is different thanks to the enthusiasm of Dr. G. R. Hall. It is well that garden-lovers of this country should treasure the name of this gentleman for the plants he introduced — *Lonicera Halliana, Magnolia stellata, Malus Halliana* and others — are indispensables. It was in March, 1862, that Dr. Hall returned from Japan and handed over his rich collection to Samuel Parsons at Flushing, Long Island, for propagation and distribution. But previous to this Francis Parkman of Jamaica Plain, Boston, had received a consignment of plants from Dr. Hall, through Mr. Gordon Dexter, and among others was the famous *Lilium auratum*, which flowered for the first time in America in July, 1862.

In the early 'sixties Thomas Hogg visited Japan in the interest of Samuel Parsons and introduced in 1865 many plants including *Magnolia obovata.*

Another American, Mr. W. S. Clark, who went from Amherst College, Mass., and developed the Agricultural College at Sapporo, in Hokkaido, in the early 'seventies of the last century, sent in

1876 seeds of many valuable plants such as *Magnolia kobus,* var. *borealis, Cercidiphyllum japonicum, Syringa japonica,* and *Actinidia polygama.* In the Arnold Arboretum and elsewhere many fine specimens raised from his seeds are growing today.

A few Japanese plants — *Rosa rugosa* for example — reached Europe toward the end of the eighteenth century, but it was not until after Commodore Perry's Expedition in 1852–'54, and the signing of the treaty on March 31st, 1854, which resulted in the opening of Japan to foreign commerce, that the plants of that land began to find their way freely to the Occident. A Russian expedition under Admiral Putiatin was in the Far East from 1852–55, and on January 21st, 1855, a treaty between Japan and Russia was signed. Shortly afterward treaties between Japan and other Western countries were signed.

From 1611 the Dutch East India Company had trading rights in Japan and established a factory on a small island contiguous to Nagasaki, and we owe our first knowledge of the flora of Japan to officers of this Company. From 1823 to 1830 Phillip Franz von Siebold was an officer in the Dutch company and resided in Japan, and from about 1850 to 1865 he imported plants to a nursery he established at Leiden in Holland. Among the most important of his introductions may be mentioned *Malus floribunda, M. Sieboldii, Wistaria floribunda,* var. *macrobotrys,* and *Prunus subhirtella,* var. *pendula.*

A Russian, Carl Maximowicz, who in 1854–1856 made very extensive collections in the Amur region of eastern Siberia, made a journey to Japan lasting from 1859 to 1864, which resulted in our first intimate knowledge of the forest flora of Japan and in the acquisition of a great many plants valuable to gardens, including *Berberis Thunbergii.*

Three Englishmen — John Gould Veitch from early spring to autumn of 1860; Robert Fortune from the autumn of 1860 to the summer of 1861; Charles Maries from 1877 to 1880 — collected extensively in Japan and each added to gardens treasures beyond price. During the same period, and in the early 'eighties various foreign amateurs in Japan sent to their friends in this country and in Europe such valuable plants as *Vitis Coignetiae, Prunus serrulata,* var. *sachalinensis, Rosa multiflora, R. Wichuraiana* and Rose "Crimson Rambler."

These historical facts are necessary to show that Japanese plants were independently introduced to this country and to Europe during the same period. The pioneer work briefly sketched above was supplemented in a remarkable manner by Professor Charles S. Sargent, Director of Arnold Arboretum, who visited Japan in 1892. His predecessors in Japan had enjoyed a virgin field but as an offset to this Sargent had the advantage which full knowledge of a subject gives. He knew not only the Japanese plants already in cultivation in the Occident but was also fully acquainted with the whole forest flora of Japan, and the result was that a great number of beautiful and hardy trees and shrubs were added to our gardens. He introduced among other plants, all the Japanese deciduous Oaks, certain Hornbeams, Birches, Alders, *Picea Glehnii, Abies sachalinensis, Malus zumi, M. Tschonoskii, M. Sargentii, Kalopanax ricinifolium, Enkianthus campanulatus, Acer nikoense, A. Miyabei, Rhododendron Kaempferi,* one of the most beautiful of all shrubs hardy in New England, and many other valuable plants. In fact, this journey was the most fruitful in results of any undertaken in Japan.

I have not the time at my disposal to enter further into this interesting aspect of my subject, but I cannot let pass this opportunity to put on record the names of those to whom all lovers of hardy Japanese plants are under lasting obligations.

Japan proper consists of four large and many hundreds of small islands and the country is much larger than many suppose. Its total length is about the same as this Atlantic seaboard from Nova Scotia to the southern end of the Florida Keys. Furthermore, the range of climate is much the same in both regions. A warm current sweeps up the east coast of Japan to near Yokohama where it is deflected out to sea and the result is that northward of this point the climate rapidly becomes colder. Geologically, Japan is made up of a broad backbone of volcanic mountains (many of the peaks of which are still active) narrowly flanked by sedimentary rocks, and here and there occur massive outcroppings of granite. There is very little limestone in Japan and this accounts for the wealth of Ericaceous plants which are a pronounced feature of the flora and occur in quantity from sea-level to the tops of many of the highest mountains. The whole face of the country is moun-

tainous and the scenery is for the most part pretty and picturesque. In the central parts of the main island (Hondo) are ranges of high mountains — volcanic and granitic — and the scenery there is bold and rugged. The sublime Fuji with its symmetrical cone, snow-capped for the greater part of the year, is 12,390 feet high and is the highest mountain in Japan.

Since the country is so broken a very considerable portion of it is not amenable to agriculture. The steep mountain-slopes are well covered with trees and shrubs and large areas are extensively forested. Also, and more especially in the central and northern parts of Hondo, there is much moorland clothed with coarse grasses and shrubs in variety. Coniferous, including Taxaceous trees abound from the extreme south to the extreme north, and, indeed, Japan with its sixteen genera of these plants is richer than any other land. From about the latitude of Tokyo southward the woods and forests contain a high percentage of broad-leaved evergreen trees and these together with the Conifers give to the country a very green appearance at all seasons of the year. North of Tokyo broad-leaved evergreens decrease in number rapidly and from Nikko northward the forests are very similar in aspect to those of New England. On the island of Yakushima, which marks the southern limits not only of Japan but also of its flora, Tree Ferns, Bananas, and Wild Figs are common constituents of the flora at sea-level. In the extreme north of Hokkaido and in Japanese Saghalien on the shores of the Okhotsk Sea, dwarf Pine, Juniper, Larch, and the Crowberry (*Empetrum nigrum*) descend to sea-level. Almost everywhere in Japan dwarf Bamboos form a dense undergrowth in the forests.

Some writers on the natural history of Japan have stated that the Straits of Tsugaru which separate northern Hondo and Hokkaido form a well-marked phyto-geographical boundary. This, however, is not true and the difference between the floras of the two regions is merely one of degree and not of kind. The warm current previously referred to, exercises a tremendous influence on the climate and on the vegetation and is responsible for the great difference between the floras of southern and northern Japan. Whilst no very hard and fast phyto-geographical line exists it may be laid down as about Lat. 36° N.

The flora of Japan is very rich in ornamental trees and shrubs and the majority of the deciduous plants and nearly all the Conifers have proved perfectly hardy and amenable to cultivation in the gardens of New England.

In Japan the Pine, the Bamboo, and the Plum-blossom (*Prunus mume*) are emblematic of long life, strength, and happiness, and a love of flowers is a dominant characteristic of the people. This love is spontaneous and fundamental and is one of the virtues of the race which appeals forcibly to the most casual visitor. The arrangement of flowers for house decoration is one of the three essential parts of every lady's education, and be it said it is an accomplishment in which the whole people excel in a manner most artistic. At no season of the year is any dwelling, be it peasant's hut or merchant's house, prince's castle or emperor's palace, without its flowers or sprig of fruit or foliage, and the graves of the departed are decked with floral decorations the year round. The Chrysanthemum is the chosen crest of the Imperial Household; three Asarum leaves found the crest of the first Shogun; one of the highest Imperial Orders is that of the Paulownia. The blossoming of the Cherry is made the occasion for a great national holiday. In the temple grounds are magnificent trees, and for old trees the love of the Japanese amounts to a veneration akin to worship.

Here and there throughout the land are places famous for their Plum trees, Cherry trees, Wistarias, Irises, Peonies, Azaleas, Maples, Chrysanthemums, Pines, Cryptomerias, and so forth, and in season people flock from far and near to feast on their beauty. These different floral seasons are kept as festivals of amity and rejoicing. Families in all their ramifications from great-grandmother to the youngest great-grandchild assemble together for a right merry time. In and near cities and where the sake-bowl flows too freely the merriment may be a little boisterous, but it is always the exuberance of good fellowship. When in Japan I found peculiar pleasure in the spirit of joyousness so manifest at these festivals.

With a few exceptions it is on trees and shrubs that the Japanese lavish their attentions. The Iris, Chrysanthemum, Lotus Lily, *Rhodea japonica, Liriope spicata,* and the Morning Glory are the only herbs that they are really fond of. The Morning Glory

(*Ipomoea rubro-caerulea*), an exotic of American origin, is extraordinarily popular and boasts societies whose object is the development of this particular flower. The blossoms open at sun-up and devotees will arise before dawn and walk long distances to gardens where this plant is grown to watch the flowers expand.

The floral seasons of Japan commence with the Ume or Plum-blossom (*Prunus mume*) in January, and close with the Chrysanthemum in November and December. In March and in April, according to climate, the Cherry trees blossom and this is the season *par excellence*. The Japanese recognize a hundred and more varieties of Cherries with white, yellow, pure pink to deep rose blossoms. Some are small shrubs, others large trees with wide-spreading crowns; some have pendent, others quite erect, branches, and all are wondrously beautiful. Cherry trees are wild in the woods and thickets throughout the length and breadth of Japan and are everywhere planted in vast numbers, in temple and castle grounds, in park and garden, in the streets of the cities and alongside the highways, and by pond and riverside. At Koganei, a village some ten miles from Tokyo, there is a three-mile avenue of Cherry trees planted in 1735, by command of the Shogun Yoshimune. Many of the trees are from sixty to seventy-five feet tall, with trunks from ten to twelve feet in girth and crowns from fifty to sixty feet through, and when in full flower the scene presented is a never-to-be-forgotten one. No language can exaggerate the beauty of the Japanese Cherries and they must be seen to be appreciated in full.

Now, there is no valid reason why here in Boston we should not have our own Cherry season, for the trees are perfectly hardy and thrive here. In the Arnold Arboretum the few large trees we have are a wealth of flowers each and every season. The Arnold Arboretum as one result of its recent expedition to Japan has now growing a collection of some seventy odd varieties of these Cherries and these will be propagated and distributed in due season. Unfortunately, in the Arboretum itself there is not sufficient spare land available to do full justice to this collection, but we hope that somewhere a proper home will be found for it.

The Wistaria, the most gorgeous of all hardy climbers, except in occasional years of severe winters, blossoms beautifully on house

and pergola in and around Boston, but I never knew the full glory of the Wistaria until I saw it in Japan. There it is not only wild in profusion but is abundantly planted by the sides of ponds, ditches, and streams, and it is trained over arbors and trellises. There are numerous varieties and on one I measured racemes of flowers sixty-four and a half inches long, and they were not mere individual examples but there were thousands upon thousands of them equally long!

About Wistaria time too the Moutan Peonies, the Iris, and the Azaleas make wonderful displays of color. Japanese Maples with colored leaves of various shape and form are well known in western lands but only a few of the varieties thrive with us. Japanese gardeners who specialize in Maples recognize over three hundred varieties, and Tokyo boasts its Maple Club, where everything from the tea-cups and the carved screens to the waiting-maids' dresses are marked with Maple leaves.

To mention in detail all the favorite garden plants would take up too much time and space but in addition to those already enumerated the following are to be found in gardens from Tokyo southward: Camellias, Bamboos, Hydrangeas, Box (*Buxus microphylla*), Black Pine (*Pinus Thunbergii*), White Pine (*P. parviflora*), Table Pine (*P. densiflora* var. *umbraculifera*), Umbrella Pine (*Sciadopitys verticillata*), Arborvitae (*Chamaecyparis obtusa*), *Ginkgo biloba, Illicium religiosum, Cryptomeria japonica, Cinnamomum Camphora, Podocarpus macrophylla, Trachycarpus excelsus, Chimonanthus fragrans, Magnolia denudata, M. liliflora, Pieris japonica, Fatsia japonica, Daphne odora, Nandina domestica, Pittosporum tobira, Ilex Sieboldii, Malus Halliana, Ternstroemia japonica, Enkianthus japonicus, Cycas revoluta, Chloranthus brachystachys,* Quince (*Cydonia lagenaria*), Weeping Willow (*S. babylonica*), Tea Plant (*Thea sinensis*), and *Physalis Franchetii.*

"The Japanese are true lovers of scenery; no people have a keener feeling for a beautiful landscape; to them a moon rising over Mount Fuji is a poem, and their pilgrimages to see Almonds in blossom or the glories of the autumn tints are almost proverbial, and yet, strange to say, in their gardens they seem to delight in setting at defiance every one of those canons which Nature has laid down so unmistakably for those who will be at the pains to read

them. The Japanese garden is a mere toy that might be the appanage of a doll's house. Everything is in miniature. There is a dwarf forest of stunted Pines, with a Liliputian waterfall running into a tiny pond full of giant gold fish — the only big things to be seen. There is a semblance in earth and stones of the great Mount Fuji, and in one corner is a temple to Inari Sama, the god who presides over farming and is waited upon by the foxes. Stone lanterns of grotesque shape spring up here and there, and the paths are made of great flat stepping-stones set well apart so as not to touch one another; shrubs, Cycads, and dwarf Conifers are planted, not without quaint skill and prettiness, but there are no broad effects, no inspiration of Nature. It is all spick and span, intensely artificial, a miracle of misplaced zeal and wasted labor. Attached to what were the Daimios' palaces in the old days there were some fine pleasure grounds, well laid out, rich in trees, and daintily kept. The gardens of the Mikado, by the shore of the bay of Yedo, are beautiful. But the average Japanese garden is such as I have described it, a mere whimsical toy, the relic of an art imported from China, and stereotyped on the willow pattern plate." So writes Lord Redesdale in his *Bamboo Garden*, and a more faithful picture could not be portrayed. Long familiar with these gardens in China I confess that I did not find them out of place in Japan. I have from experience become accustomed to regard them as belonging to the natural order of things appertaining to the Far East. But in the West, and in New England especially, they have no place. Let us cultivate in our gardens here all the beautiful plants that are hardy in this climate; let us inculcate that profound love of Nature so dominant in Japan; let us in our gardens take full advantage of natural beauty; let us import no exotic style of gardening, but strive to develop American gardens in harmony with American scenery and climate.

THE MISSOURI BOTANICAL GARDEN.

By Dr. George T. Moore, St Louis, Mo.

Delivered before the Society, with stereopticon illustrations, January 29, 1916.

The cultivation of plants for their healing qualities by the monks of the middle ages is generally supposed to have been the forerunner of the modern botanical garden, although these mediaeval gardens doubtless had their origin in others of greater antiquity. In a recent treatise on embroidery and lace by a Frenchman, the ingenious theory is advanced that the idea of a botanical garden originated during the sixteenth century in France, when the demand for flowers and fruits to serve as patterns for the designing of brocades caused the horticulturist, Gene Robin, to open a little garden, with conservatories in which he cultivated strange and little known varieties. This proved to be such a success that Henry IV. purchased the establishment and under the name of "The Garden of the King" it became crown property. In 1626 the learned Guy de Brosse suggested that medical students might study these plants without interfering with the designers of embroidery and tapestry. Hence the first Jardin des Plantes, with its natural history museum, came into existence. This institution served so many excellent purposes that other countries rapidly attempted to duplicate it — the author concluding with the naive statement, "Who would have thought it possible for embroidery thus to come to the aid of science?"

Unfortunately for this notion as to the origin of botanical gardens, the Jardin des Plantes was founded by Louis XIII. in 1610 and although the aesthetic study of plants and of flowers must undoubtedly have appealed to those who visited the garden, just as it does today, it seems quite certain that such collections of living plants were primarily brought together because of their real or supposed medicinal value.

The function of a botanical garden as an aid to scientific teaching

and research did not develop much, if at all, prior to the middle of the seventeenth century, when those at Bologna, Montpellier, Leiden, Paris, and Upsala became more or less noteworthy in this respect. The taste for ornamental and decorative plants had meanwhile slowly been gaining ground, as well as the desire to cultivate rare and unusual species. Many persons of wealth and influence, during the eighteenth century, became, through the employment of men skilled in botany and horticulture, generous patrons of science. The world was searched for new and rare plants which were brought to Europe for cultivation, and magnificent volumes describing these collections were published. The older gardens were essentially private institutions, but later many of the existing establishments, with an increasing number of new ones, were opened to the public, either without charge or for a small admission fee.

The modern botanical garden has a number of functions which did not appear simultaneously, but were a matter of gradual development. Beginning with the utilitarian idea, there were added the aesthetic, the scientific, and the educational, using these words in the broadest sense. Depending largely upon local conditions, these functions have been given different degrees of prominence, some gardens being essentially aesthetic, some mainly scientific, and others combining in about equal proportions all of the elements mentioned. Certainly the modern tendency is to make the botanical garden something more than a "museum of living plants" which, however necessary, is to a large degree uninteresting and lacking in its appeal to the public.

Most botanical gardens in this country are either connected with some institution of learning or maintained wholly or in part by the municipality. In this respect the Missouri Botanical Garden is unique, since it has no connection whatsoever with the city, paying taxes on all its revenue-producing property and only indirectly being associated with Washington University, through the graduate school of botany.

The garden as it now exists is the development of the private garden of Mr. Henry Shaw, who came to this country from England in 1818 and soon after settled in St. Louis. Acquiring a fortune within about twenty years, Mr. Shaw devoted the larger part of the remaining fifty years of his life to the enlargement and manage-

ment of this garden, which, although freely opened to the public, remained his private property until his death. Seeking the advice of such men as Dr. George Engelmann, Sir William and Sir Joseph Hooker, and Professor Asa Gray, Mr. Shaw, in a will, remarkable for its breadth and farsightedness, left to a self-perpetuating board of trustees the administration of his property and, through a director, the management of the garden which he himself designated as the Missouri Botanical Garden.

It may truly be said that practically all the various aspects of the work of this garden at the present time, whether they be scientific, educational, or aesthetic, were conceived by Mr. Shaw and provided for in a very definite manner by his will. As funds have become available, various aspects of the work have been enlarged and it is possible that in some respects the development has proceeded further than Mr. Shaw imagined possible, but the germ of the idea may be found in his will and had he lived to the present time it seems more than likely that his own management would have produced practically the institution as it now exists.

The garden comprises about one hundred and twenty-five acres in the heart of the city, about sixty acres of which are as yet unimproved. It is in no sense a part of the park system, being enclosed within a stone wall or fence, and pleasure vehicles are not admitted. In addition to the ordinary landscape treatment of such a garden, including the usual plantations of trees, hardy shrubs, and flower beds, there are also special outdoor collections comprising such features as the so-called "North American tract" in which are included a systematic arrangement of a considerable number of plants hardy in the vicinity of St. Louis; a small arboretum; a medicinal garden; a large Italian garden, laid out on strictly formal lines; a so-called "Linnean garden," which takes its name from one of the older greenhouses, called by Mr. Shaw the "Linnean house," and which because it is bounded on three sides by a wall, is patterned after some of the English gardens; a rose garden; an economic garden, in which are displayed special collections of useful plants, such as rice, peanuts, tobacco, sugar cane, cotton, farm crops of various sorts; examples of vines, hedge plants, annuals and perennials suitable for growing in the vicinity of St. Louis; bee plants, herbs, small fruits, and anything which can

serve as a demonstration to the public of what may be accomplished in the growing of useful and ornamental plants. Four sample back yards of varying size and treatment are included, and plans for the future contemplate the addition of various other features for which there seems to be a demand.

Within the last three years about 100,000 square feet of display greenhouses have been added, within which are maintained permanent collections of palms, economic plants, ferns, desert plants, cycads, orchids, etc. There is a floral display-house, 200 x 50 feet, where a continuous flower show is maintained from October to July. This house is admirably adapted for the purpose and probably nowhere else in the country does the public have an opportunity for seeing such an exhibition of blooming plants. Next spring this house is to be devoted to a typical Shakspearean garden with beds, hedges, trellises, fountains, garden furniture, and plants mentioned by Shakspeare, and will duplicate as nearly as possible the Elizabethan garden of three hundred years ago.

In addition to the outdoor and indoor collections of plants, the garden maintains one of the best botanical libraries and herbariums in the United States, and these two features serve as most important adjuncts to the Shaw School of Botany which, with adequate laboratory facilities, devotes its principal endeavor to the training of graduate students in botany, these students receiving their master's or doctor's degree from Washington University. This school, although largely maintained by the funds of the garden, is a department of Washington University. A small experimental greenhouse, just completed near the laboratory, provides the necessary working space for the graduate students. Under this greenhouse there are cellars, devoted to the experimental side of mushroom growing, as well as a large pit in which investigations concerned with the rotting and destruction of timber are carried on.

The small museum and library building, erected by Mr. Shaw, is now devoted to a remarkably fine collection of specimens illustrating the diseases of wood, and from time to time special exhibitions of special interest are shown here.

In addition to the graduate students, a school for gardeners is maintained, which, because of the unique opportunities available, and the special character of the work, is perhaps not to be equaled

elsewhere in this country. Young men and women who have received a high school training or its equivalent are admitted on examination and devote three years, of twelve months each, to the practical and theoretical aspects of landscape designing, floriculture, horticulture, engineering, etc. The courses include such subjects as diseases of plants, entomology, soils, mechanical and freehand drawing, plant breeding, general and systematic botany, as well as the various more strictly horticultural subjects. The morning of each day is spent in practical work, both indoors and out, and by the end of the third year the student has had an opportunity to become personally acquainted with the definite growing methods and management of such groups of greenhouse plants as orchids, palms, tropical economic plants, desert plants, etc., as well as the actual propagation, growing and care of practically every sort of plant which can be grown out of doors in St. Louis.

While the plan and conduct of such a garden is essentially scientific, differing from most private estates or parks, the public apparently appreciates the efforts being made, since the attendance is constantly increasing. It has been amply demonstrated that a garden of this character will furnish recreation and pleasure to thousands who are not seeking merely for amusement, and every effort is made to have the collections, in so far as possible, informational if not instructive. Naturally, such a place must be attractive and the mere accumulation of numbers of botanical species, crowded together, will not answer the purpose. By maintaining floral displays of plants which are either little known, or because of the wealth of bloom and color cannot be seen elsewhere, and by showing rare tropical plants which, because of their fruit or use in commerce, are known to the average individual, as well as the commoner things which are frequently read about but seldom seen, the garden is able to make a definite appeal to many. Such an institution, with the various enterprises referred to, is naturally expensive to maintain and it is impossible to do all in any one department that might be desirable. However, it is believed that the income will eventually be sufficient to support the various projects now under way and that ultimately the Missouri Botanical Garden will become an even greater monument to the greatest patron of botany and horticulture that this country has ever known.

ALFALFA CULTURE IN NEW ENGLAND.

By Prof. S. C. Damon, Kingston, R. I.

Delivered before the Society, February 5, 1916.

Alfalfa is the oldest agricultural plant in history, the third in value in the United States, and almost the latest to invade conservative New England agriculture.

There is no more interesting, important, and often profitable part of an up-to-date farmer's business than the trial of new seeds and plants. Here now, we have this alfalfa plant, a comparatively new introduction into the United States, making every year a more persistent claim for our attention and asking for a trial on every New England farm. But first let us get more acquainted with this wonderful legume: a perennial in its nature, this "Child of the Sun," as its name Lucerne implies, this "best of all grasses" as the name signifies. I referred to alfalfa as being new to this country. It is comparatively so, but in the history of agriculture, it is the oldest of all forage plants, for it is mentioned in Roman history 2500 years ago, when its virtues were known and recorded by Pliny, one of their greatest writers.

Alfalfa was introduced into the United States in 1854, probably by some gold hunters, who, in their journey to California by the way of Cape Horn, stopped at some port on the South American Coast, perhaps Chili, where they saw this wonderful plant growing and it attracted their attention so much that they took some of the seed with them to California, whence it has spread all over the West.

The introduction of alfalfa into the eastern part of the United States was brought about in an entirely different manner. It was through the foresight of a German, Wendell Grimm, who, coming to make his home in this new country in Minnesota in 1857, naturally brought with him a little seed of the crop which he prized most highly in his old home and that is said to be the origin of the famous Grimm alfalfa.

To grow alfalfa successfully here in New England, let us first find out what is adverse to its culture.

First, the Soil. Most of our soils are naturally well drained, so that there is n't the necessity of tile draining in preparation for alfalfa that there often is in the Middle West. The first requisite to successful fields of alfalfa, that the water-table shall not be within 3 or 4 feet of the surface, is thus met.

How about the soil? Most of the New England soils are of glacial formation, and while they do possess many qualities favorable to alfalfa growing, there is one very essential ingredient in which they are generally deficient and that is lime. Alfalfa is above all a lime-loving plant, and so dependent upon lime is it that there is small chance of establishing a permanent field unless there is naturally or has been applied sufficient lime to correct the naturally acid condition of the soil.

This plant belongs to the legumes, a class of plants that have on their roots when growing in a neutral or alkaline soil, numberless small nodules that contain the numerous nitrogen-gathering bacteria. These have the power to draw nitrogen from the air and by symbiotic action benefit the plant during its growing period. These organisms cannot live in an acid soil. Neither does a crop of alfalfa thrive unless the roots are well noduled, hence the necessity of frequent and liberal applications of lime. The element, nitrogen, is the most important to all plants and the most expensive to purchase, so all that can be drawn from the air should be used. A ton of alfalfa hay contains 44 lbs. nitrogen, so that a crop of 4 tons per season, not an unusual crop, would contain 176 lbs. nitrogen, at 15c lb. equals $26.40, two-thirds of which, according to Whiting, is taken from the air by the bacteria on the roots. What a vast gain, when we consider further that about one-third of the nitrogen in the whole plant is in the roots. The fertilizer value of the roots and stored fertility, according to Professor Voorhees, from an acre of alfalfa is $65.00.

The second benefit of lime when applied to our New England soils is to furnish sufficient calcium for the needs of the plants, for a ton of alfalfa hay contains 59.86 lbs. of lime or a four-ton crop would remove 236 lbs. of actual lime per season from the soil.

It has been well settled that alfalfa will not grow upon an acid

soil. That acidity stands for failure, hence test the soil of a new field before planting it and make sure that the reaction of the soil is right at the outset.

The two forms of lime most used in agricultural practice are air-slaked lime and ground limestone. They are both good undoubtedly but those of you who have had the pleasure of hearing the late Joseph E. Wing give in his inimitable way his reasons for using carbonate of lime for alfalfa fields are convinced of the desirability of always using ground limestone. The only way in which we are likely to fail is in not using enough. The growing of alfalfa resolves itself, then, into a chemical problem.

Selection and Preparation of Field.

For the first planting of alfalfa on one's farm it is preferable to select a field of good sandy loam. It might still further be defined as good corn land soil.

It is best to use a field that has been under cultivation the previous season in some hoed crop, and is thereby well cleaned of weeds. In the spring the first operation is to broadcast over the field a good application of eight cords of stable manure per acre if available, to be plowed in deeply and thoroughly. The manure is doubly valuable to use here, not only for the plant food it contains but for its humus and for its physical effect in the soil, making it more friable and materially increasing its water-holding capacity, but perhaps the most valuable benefit is that it carries into the soil the numerous bacteria that it contains and that are so helpful in creating a productive soil.

Lime.

The lime necessary should now be applied at the rate of at least two tons of air-slaked or four tons of ground limestone per acre and thoroughly harrowed into the soil. The seed bed should be made firm below and fine and loose on the surface for the following reasons: a firm, compact soil is very much the best for capillary

action in the soil and moisture will rise much more readily to assist in the germination of the seed. The soil in which the seed is planted should be made fine by repeated workings so that each seed may be completely surrounded and enveloped in a coat of soil grains, thus insuring good germination.

Inoculation.

The question of whether to use air-slaked or pulverized limestone is not so important as it is to use sufficient lime in either form to correct the soil acidity because the bacteria that we want to have grow in the alfalfa soil and that are often found attached to the small roots thrive only in an acid-free or alkaline soil.

These bacteria have the power to assimilate nitrogen from the air, a remarkable function but one that works great benefit to the plant on whose roots the bacteria live. So important is this function that the plant not only receives sufficient nitrogen to produce a large growth of green tops but there is stored in the roots from $25 to $30 worth of nitrogen per season.

To bring this condition about, if alfalfa is to be sown on a field where it never grew before it would be very much more likely to succeed if it were inoculated. There are two ways of accomplishing this, now in common practice. One is to bring soil from a field where alfalfa is growing successfully and that had nodules on the roots. Take about 500 pounds per acre to the new field and sow it broadcast, on a cloudy day preferably, and harrow it well into the soil. That is all that is necessary. Then when ready sow the seed as usual.

The other way is to procure from the U. S. Department of Agriculture, that will send to each applicant enough artificial cultures of the bacteria to inoculate an acre; or similar cultures may be bought of the manufacturers. These artificial cultures are used on the seed by treating it according to directions. Then the seed is sown in the usual way and the seeding completed. Either of these methods is usually successful and the one to be used would usually depend upon whether one could get soil from a nearby alfalfa field or if that would be too expensive, then use the second method which should not cost over $2.00 per acre.

Fertilizing.

In the preparation of the field for seeding, it is not always possible to use sufficient stable manure and so fertilizer chemicals are used. It has been found profitable to use a fertilizer containing available nitrogen at the time of seeding because of the great benefit to young legumes by having soluble nitrogen present as demonstrated by the late Professor Hellriegel of Germany. The alfalfa plant is no exception to this rule, for no matter how sturdy it may become in its maturity, in its earlier stages it is weak and tender.

The fertilizer should be further made up of from 300 to 500 lbs. of acid phosphate or better Thomas basic slag and 200 to 300 lbs. of potash salt, preferably the sulphate, for according to Doctor Brooks the yield of hay from sulphate exceeded that from muriate by 18 per cent. After the field is well established, it is good practice to annually top dress each spring with 300 to 500 lbs. of acid phosphate or basic slag and 200 to 300 lbs. of sulphate of potash.

Seeding.

After the inoculation and fertilizers have been sown and thoroughly harrowed into the soil, the seed bed levelled and smooth, it is ready to sow the seed. There are two times in a season when a field may be successfully seeded. One is very early in the spring, say by April 10, and the other is after an early crop of potatoes or grain, that is, from July 15 to August 15. The thing to be desired in seeding is to sow at such a time that the crop may make a successful growth ahead of the weeds.

The variety and amount of seed to use per acre is important. There is no better variety that we know than the Grimm, spoken of earlier in this talk, although there are numberless varieties being grown and studied at some of the Experiment Stations.

Any northern grown seed like that of the Canadian variegated, Sand Lucern, Baltic, Minnesota or Dakota grown seed can be used with safety and usually found reliable.

A pound of alfalfa seed contains approximately 220,000 seeds,

enough to plant 5 seeds per sq. ft. on an acre, but as there is the difficulty of even distribution and loss from poor seed or the seeds not being covered, it is best to sow 15 to 20 lbs. per acre. If drilled in, the 15 lbs. is sufficient; if sown broadcast, sow 20 lbs. per acre.

In a comparison of 10 and 20 lbs. of seed per acre made at Wisconsin and reported in Bul. 259, it was found that with 10 lbs. of seed per acre there was more trouble from weeds and blue grass, that the alfalfa grew a little taller, while 20 lbs. to the acre gave hay of a better quality, a thicker stand and a larger yield.

Harvesting.

When to cut a field of alfalfa for hay is best determined by an examination of the plant, both as to blooms and more especially as to the appearance of the sprouts at the base of the stems. The crop should be cut before the new shoots are tall enough to be clipped by the mower, else the next crop will be much injured. The rule to cut when the field is about one-tenth in bloom is also sometimes followed but the best authorities on alfalfa growing say to be guided by the new shoots and always cut when they are well started.

In this connection, I would call your attention to the record of yields from two equally good fields of alfalfa at the Rhode Island Experiment Station. One was cut when the plants had about reached maturity but neither blossoms nor sprouts were visible. The other field was cut at the proper time. The total yield from the three cuttings, the third or last being made at the same date on both, was in favor of the mature rather than the very early cuttings: Early 4.24 tons, Mature 4.50 tons.

Curing the Hay.

It is good practice to begin mowing as soon as the dew is off in the forenoon and then rake into small windrows about four o'clock. Then either make small haycocks at once or let it lie until the next day and turn it and then cock it.

The theory of curing alfalfa is to save all the leaves on the plant for 45 per cent of the protein of the hay is contained in the leaves. This is best done by raking before the leaves dry to a crisp. In the wilted stage they continue to draw water from the stems and evaporate it, thus the process of curing goes on in the haycock. Some have adopted drying racks for curing alfalfa hay. The wilted alfalfa is piled on these at once from the windrow and with a hay cap on the top is safe from any storm that may come. A week's time is usually sufficient to cure the rack of hay thoroughly when in the middle of a good bright day it is drawn directly from the stack to the barn. As a safeguard to preserve the stand, it is not best to cut later than September 5.

Yields per Acre.

The average yield per acre here in New England is about 3.2 tons per season, according to Doctor Brooks, in his coöperative experiments. It is usual to cut three crops and of course the first is the heaviest. The amount of the other two depends upon the amount of rainfall through the growing season. The first crop usually is above two tons per acre and each of the other two, one ton each.

As to the risk from storing alfalfa hay too green, I asked Professor Moore, of Wisconsin, if he ever knew of a case of spontaneous combustion and he answered as follows:

"I do not know of a single case of spontaneous combustion that has occurred from storing alfalfa in barns."

Value of the Hay.

It might be asked what is the best use of alfalfa hay on the farm. My answer to that would be that there is not a single farm animal but will eat it with a relish and thrive upon it. It is the richest of all forage crops in protein, so it is fed by dairy men who feed scientifically for the largest milk production. It is the best of all hays for horses that have unusually hard work, and for growing colts it has no equal. For poultry, you are well aware of the demand for

ground alfalfa meal and how it is all brought into New England. I hope to see the day when we shall have alfalfa enough of our own and mills here in New England to grind it.

For hogs alfalfa is one of the best of feeds. In summer it is ideal to see the hogs feeding in the growing field and making gains at the lowest possible cost and then in the winter they are fed the dry hay in racks much the same as cattle.

For sheep as well as the other stock it is so much better than timothy that there is no comparison.

Our good old standard, timothy, that New England farmers have grown for generations is "hard hit" as a dairy feed or for growing stock when compared with alfalfa. I urge upon you the benefit to be derived from growing and feeding more of this legume.

Feeding Value.

If a field of alfalfa yields three cuttings per season for four years it has more than paid for its founding and then when it is plowed and taken into a cultivated crop we begin to realize as never before the full value of this wonderful plant. Records show that large yields have been obtained of corn and potatoes on an alfalfa sod. How can it be otherwise, with the ground filled with alfalfa roots to decay and form humus that is rich in nitrogen?

THE DEVELOPMENT OF FRUITS FOR SPECIAL CONDITIONS.

By W. T. Macoun, Ottawa, Canada.

Delivered before the Society, February 12, 1916.

It is only during comparatively recent years that much attention has been given in America to the relative suitability of the many kinds and varieties of fruits to different parts of the country. This is largely due to the fact that it is not so many years ago since there was comparatively little fruit grown, except that which was produced in the Eastern States and Eastern Canada where the differences in climate were not so striking as they are between the Eastern and Western States, and between the middle West, and the East and West. When, however, the middle West, and the West, began to produce such enormous quantities of fruit, large quantities of which reached the Eastern markets, attention was called to the fact that some varieties of fruit looked and, some will say, tasted quite differently from the same varieties grown in the East.

Certain sorts were found particularly suited to the climatic conditions of the West, while others did not succeed so well. On investigation, or when we really came to think seriously about it, marked differences were found in the relative success obtained with varieties in different parts of the East, some sorts doing much better than others in a certain section of the country, while in another place they did not do so well. Now the adaptation of varieties to soil and climate is receiving a great deal of attention.

Perhaps another reason why more study had not been given to the adaptability of varieties until recently is that there are such great areas in North America where the growing and ripening season is very favorable to fruit culture and many sorts that will withstand the winter climates succeed over a wide range, as they get sufficient heat, sunlight, and moisture for the fruit to develop well. How different this is to Great Britain and certain parts of

Europe where some kinds and varieties of fruits are grown with great difficulty and where special methods of culture and training have to be adopted to get the fruit to mature, and where adaptability has been a serious question with the people for many years.

Many English gardens are surrounded by high walls not only for the sake of privacy, but to obtain the climatic conditions which the owner desires to get. To show how important these walls are and the exposures necessary for different kinds of fruits, I quote the following from an English book known as "The Gardener's Assistant" (Thompson).

"The southern aspect (he writes) being the most important requires to be taken first into consideration. It may according to circumstances face either directly south or it may be inclined to the south-east to face the sun about eleven A. M., or it may incline to the south-west to face the sun about one P. M. In parts of the Kingdom where the climate is sufficient to ripen peaches and nectarines perfectly, on a wall facing the sun at eleven A. M., that aspect should be chosen, as in that case the adjoining walls can proceed at right angles and afford two good western aspects on which the sun may commence to shine as early as eleven A. M., so that apricots, plums, cherries, and the finest sorts of pears could be ripened to perfection upon it. But if the heat against an aspect, thus inclined an hour to the east of the meridian, is not sufficiently intense to ripen peaches satisfactorily, the aspect must face the sun at noon and, where the climate is still colder, it will be advisable to turn the aspect directly to the sun at one P. M. The eastern aspect is recommended for summer and early autumn fruits, for, owing to the ripening period of these being nearly that at which the hottest weather occurs, an indifferent aspect will ripen them tolerably well." This attention to aspects where a greater or less amount of heat is obtained is based on temperature records which the author describes in these words. "Moreover, the average force of the sun's rays in the three hours before twelve noon is, according to these observations about 44° Fahrenheit and in the three hours after twelve it is 62° Fahr. From this it is evident that a wall with a west aspect must be much warmer than one with an east aspect. The sun shines on a clear day as long on the one as on the other but not with equal intensity. For three

hours before noon the sun shines on the east aspect at the same mean angle as he does on the west aspect for three hours after noon; but during the latter period his rays have according to the above observations about 40 per cent greater intensity."

The results which the English gardener obtains with fruits under what some of us might consider rather trying climatic conditions is remarkable.

The importance of the local climate in growing fruits successfully or otherwise was well brought out in an article on "Climatic Adaptation of Apple Varieties" by Dr. J. K. Shaw of the Massachusetts Agricultural Experiment Station at Amherst in the 23rd annual report of that Station from which the following is a quotation:—

"There is a close relation between the mean summer temperature and the development of the fruit. For every variety there can be determined a mean summer temperature at which it reaches its highest and most satisfactory development. Any departure from this mean results in greater or less inferiority of the fruit, the degree of inferiority depending on the amount of the departure and the variety. A summer mean too low for a variety results in (1) greater acidity, (2) increased insoluble solids, (3) greater astringency, (4) less coloration, (5) decreased size, (6) scalding in storage.

"A summer mean too high for a variety results in (1) uneven ripening, (2) premature dropping, (3) rotting on the trees, (4) poor keeping quality, (5) lack of flavor, (6) mealiness, (7) less intense color, (8) decreased size."

Color in Apples.

The cause of high color in apples is not thoroughly understood, but it may be said that each variety of apple has a color or a possibility of a color or colors peculiar to itself and it requires the proper conditions and chemical changes to develop them and make them apparent to the eye. Certain conditions will intensify the color of a variety, and others will lessen it. Some of the principal apparent causes of the development of color in fruit may be considered. It is well known how important a factor sunlight is in the development of color in fruit.

Fruit that is hidden by foliage is not as well colored as that exposed to full sunlight, hence the importance of thoroughly pruning and thinning. During the past few years it has become quite an amusement to cover part of an apple early in the season with a letter or letters or the profile of some person. Underneath these letters or profile the right color does not develop and when they are removed the letters stand out in green and yellow in the surrounding red, to the wonder of the uninitiated, thus showing that sunlight is necessary for the development of high color. Heat is also an important factor in determining intensity of color. Each kind of fruit appears to have its optimum or best mean temperature in the growing season. In countries or districts with cool summers for the kind of fruit in question the fruit is not as a rule highly colored and where the summer temperature is very high some varieties of apples are not as well colored as where the summers are a little cooler. Fruit on young trees growing vigorously and causing the fruit to grow late is not well colored. This leads to the conclusion that the degree of maturity of the fruit has much to do with the color.

In Ontario late keeping varieties have the best color in the warmer districts where the fruit becomes most mature before picking. Early varieties or those that mature in summer or early in the autumn get sufficient heat in most places in Canada where apples are grown to reach their full development in comparatively warm weather, hence are highly colored over a much wider area than are the late winter varieties which, where the season is relatively short and the autumn cool, do not reach their best condition. In warm, dry seasons fruit matures earlier than in seasons which are less so, and if well developed the more mature the fruit is before it is harvested the higher the color will be. The fruit in the dry districts of British Columbia, Oregon, Washington, California, and some other States is noted for its high color. There the trees are irrigated and by stopping irrigation and causing a ripening of the wood of the tree and a thorough maturing of the fruit the latter becomes highly colored.

In orchards where the trees are in the sod, winter apples are usually more highly colored though smaller than in cultivated orchards, evidently because the trees ripen sooner and the fruit

matures more quickly than in cultivated grounds. This leads to the conclusion that moisture must play an important part in the coloring of fruit, as the relative amount of moisture and heat will determine to a large extent when the tree stops growing and when the fruit will mature. British Columbia, Oregon, Washington and other places where irrigation is practiced afford the best combinations of sunlight, heat, dryness, and moisture, hence it is that some of the most highly colored fruit is produced there. What part, then, do soils or plant food in soils play in the production of highly colored fruit? This is a question in which every fruit grower is interested. From the foregoing statement it can easily be seen that warm, well-drained soils are most likely to produce apples of high color, as on these soils the tree and fruit will mature earlier than on wetter soils.

Local Climatic Influences.

Some horticulturists have already made lists of apples showing the number of heat units required during the growing season to bring the different varieties of apples to their full development; these lists being based on the heat units during the growing season where these varieties are succeeding best. These lists are valuable guides to intending planters. In our experience at Ottawa it has been found that the maximum temperatures, at least with the grape, are as important as the mean temperature or the total number of heat units. Unless certain maximum temperatures are reached the variety does not ripen. Some grapes will not ripen if there is a cool September and October, while others will ripen every year. Those which ripen in the coolest seasons with us are Early Daisy, Manito, Champion, Jewel, Moyer, Winchell or Green Mountain, Dracut Amber, and Peabody. As many as 118 varieties of grapes have ripened with us in a warm season and it is interesting to find that the relative time of ripening varies according to the season. In a warm season certain varieties will ripen earlier than others that will in a cool season mature first. The Vergennes, one of the latest sorts to ripen in the best grape districts, does not require high temperatures in which to mature and ripens even in a rela-

tively cool season at Ottawa. The Concord, on the other hand, rarely ripens there.

Sufficient has probably now been said to show the important relation of the local climate to the kinds and varieties of fruits which will succeed best and the importance of growing those that reach their highest development under certain climatic conditions.

Originating Hardy Varieties.

What is being done to obtain other sorts more suited to the many climates found in North America? I shall in this paper do little more than describe some of the work which is being carried on in Canada, as it is with this that I am most familiar, but busy workers are engaged on problems more or less similar in the various States in this country.

Although the McIntosh and Fameuse apples are well-known fruits and both natives of Canada, the number of varieties of fruits of Canadian origin grown commercially in Canada is very limited. Up to the time when the Experimental Farms were established in 1886 there were few persons that were interested in originating new fruits and even today the number interested is very limited. Canadians have had to depend for their fruits of all kinds mainly on other countries, the United States having contributed the largest number, but even in the United States little systematic effort has been made to originate fruits until recent years, most of those now on the market being chance seedlings the merits of which have been discovered.

Let us now see what has been done and is being done by systematic work in Canada and the United States in the development of fruits for special conditions, and as I am more familiar with our own work than any other the results of it will be given in some detail to show what can be accomplished; and as the largest part of the work has been with the apple this fruit will be dealt with first.

In Canada there are many climates varying from the extremely mild one of the West coast and Vancouver Island to the extremely cold one of the north and central parts where the temperature in winter frequently falls to between 50° and 60° below zero. There

are great differences of climate in summer also, it varying from the extremely dry warm summers of the Okanagan and other Valleys of British Columbia to the cool, moist, summer climate of Prince Edward Island where the winters are rather severe and the cool, moist, summer climate of the Lower Mainland of British Columbia where the winters are mild. It is our desire to obtain fruits specially suited to each of the many climates in the Dominion.

As the need for hardy varieties for the prairie provinces was and still is very great, there being no known apples of good size that will succeed without protection all over the prairies, an early attempt was made to obtain some suitable for such conditions. The Wild Siberian crab apple, *Pyrus baccata*, which is found wild nearly or quite to the Arctic Circle in Siberia, seed of which was imported from the Royal Botanic Gardens, Petrograd, Russia, in 1887 was, on being tested, found to be quite hardy on the open prairies, but the fruit was very small, being only about half an inch or less in diameter and very astringent. The late Dr. Wm. Saunders began crossing this crab apple with named varieties of apples in 1894 the varieties used being such hardy sorts as Tetofsky, Duchess, Wealthy, McIntosh, Yellow Transparent, and others. He obtained about 800 cross-bred trees as a result of this work, and these began to fruit in 1899. Much the largest proportion of these bore fruit little if any better than the mother parent, but a considerable number showed a marked advance in size and quality. The best were from twelve to fourteen times heavier than the fruit of *Pyrus baccata*. The largest fruits, however, were under two inches in diameter. Those best in quality have little or no astringency and compare well in quality with the well-known crab apples. They have proven hardier than the latter, however. So hardy are some of them that in latitude 58° in the Peace River Country, where the temperature frequently goes down between 50° and 60° Fahr. below zero, fruit has been grown. The fruit of nearly all of these has the marked crab apple characteristics of long, slender stem, thin tender skin, and crisp breaking flesh. The names given to some of these are Charles, Jewel, Silvia, Elsa, and Tony. A large number of trees of these crab apples were sent out to settlers in the prairie provinces between 1903 and 1906, and in many reports recently received the people have expressed their appreciation of these hardy fruits.

None of the varieties from this first crossing were large enough to compare favorably with good sized apples. The best of these first crosses were, in 1904, crossed with the apple again. In this work some of the same parents used in the first crossing, such as Duchess, McIntosh, and Yellow Transparent were again used and over 400 trees were obtained. Of these 24 have borne apples two inches and more in diameter, some of the largest being $2\frac{1}{2}$ inches. Most of these second crosses retain the long slender stem, the thin tender skin and the breaking flesh which are characteristic of *Pyrus baccata*. These are now being tested for hardiness on the prairies, but it is too soon yet to reach conclusions, but the foundation has been laid for a new race of apples specially suited to prairie conditions.

Work in developing apples for the Canadian prairies is going on in another direction. A few of the hardiest Russian apples are succeeding in favored parts of the prairies, and to obtain, if possible, other and better varieties which will succeed even under the severest test, many thousand seedling trees of the hardiest Russian varieties are set out as yearlings in nursery rows and exposed to the severe weather. Many of these trees though still young and not yet in bearing have gone through from two to three winters without material injury and it is expected that at least a few hardy, good sorts will be obtained in this way.

There are, however, no perfect varieties of apples available even for those milder parts of Canada where apples are grown in large quantities, there being one or more weak points in them all. An endeavor has, therefore, been made to obtain other and better apples covering the whole season from early summer to late winter, and the results so far have been very gratifying, though there is much yet to be done.

Seed was sown at Ottawa in 1898 of such well-known varieties as Northern Spy, McIntosh, Wealthy, Fameuse, American Golden Russet, Shiawassee, Gano, and others. From the trees grown from this seed, detailed descriptions have been made of over 1211 varieties which have fruited. Descriptions were made of good, poor, and indifferent seedlings, the object being to get some data which would show the proportion of characters of the mother tree which were reproduced to at least some extent in the seedlings.

Before beginning this work it was expected that a large proportion of the seedlings would prove to be crab apples, but quite the contrary is the case. Of 1211 seedlings taken as they came only 3.95 per cent are small or crab-like. There are 12.75 per cent which are below medium in size and are not considered of marketable size, but the remaining 83.30 per cent bear medium to large fruit. It has been found that in most varieties many of the characteristics of the mother parent come out quite strongly.

Out of the 1211 varieties there were 378 which seemed sufficiently promising for some part of Canada that they were propagated to save the variety, and out of this number 99 were considered so promising that they were named.

Let us now analyse the seedlings of a few well-known apples beginning with the McIntosh which, though an apple of Canadian origin, is well known in Massachusetts.

The McIntosh is a highly colored red apple above medium in size, briskly subacid and of very good flavor and quality. Its season at Ottawa is from November to February or March. Of 120 seedlings described 65.83 per cent were highly colored red or crimson apples; 76.67 per cent were medium to large in size; and 23.33 per cent were below marketable size, being a larger proportion than from most parents; 19.16 per cent were sweet apples; 4.18 per cent mildly subacid; 60.00 per cent subacid; 15.83 per cent briskly subacid and .83 per cent acid. As regards quality only 11.66 per cent were medium or inferior in quality; 41.67 per cent were above medium or pretty good eating apples; and 46.67 per cent were good to very good in quality or really good dessert apples. The season of 1.67 per cent was August to mid-September; of 18.33 per cent mid-September to mid-October; of 28.33 per cent October and November; of 34.17 per cent November to February or about the same season as McIntosh; and 17.5 per cent were in season from December to March or April. Some of these seedlings have a strong resemblance to McIntosh in color and flavor, but are of different season. Three of the best of these are Melba, an August apple; Joyce, a September apple; and Pedro, an October apple. Of 120 McIntosh seedlings, 19 have been named.

The Northern Spy is well known as a well-colored winter apple of very good quality. Of 136 seedlings which fruited only 12.5

per cent were below marketable size. The predominating color of 72.79 per cent was crimson and red. Of sweet apples there were 6.62 per cent; mildly subacid 5.15 per cent; subacid 60.29 per cent; briskly subacid 25.00 per cent; and acid 2.94 per cent. There were 23.53 per cent of medium or inferior quality; 50 per cent above medium and 26.47 per cent of good to very good quality. In regard to season, only .74 per cent was in season from mid-August to September; 14.70 per cent from mid-September to mid-October; 38.23 per cent October and November; 27.21 per cent November to February; and 19.12 per cent December to March or April. Here again we have apples of the Northern Spy flavor in season from fall to late winter, such as Thurso, an October apple; Rocket, a November apple; Donald, a December apple; and Niobe and Elmer, winter apples; and other good sorts. Of 136 Northern Spy seedlings 22 have been named.

Just one more example to show the results from a variety of medium or inferior quality; the Gano, which is very similar to Ben Davis except that it is more highly colored. There were 83 seedlings of Gano described. Of these 68.67 per cent were medium or inferior quality; and 31.33 per cent above medium; and not a single variety of the 83 was good in quality as compared with 46.67 per cent McIntosh of good quality and 26.47 per cent Northern Spy. There was a high percentage, however, of late keeping apples, 49.40 per cent, the Gano being a good keeper. These examples of the seedlings from three mother parents will give a good idea of the results obtained. With this lot of 1211 seedlings the male parents were unknown. When the seed was taken it was believed that in an orchard containing several hundred varieties there would be many combinations which would not be brought about by hand pollination and the results have been more satisfactory than was hoped.

Ever since 1899, hand pollination or artificial cross-breeding has been carried on and a number of the trees resulting from this have now fruited and a few good varieties have been obtained, and it has been shown that certain characters of both the individual parents can be obtained in the cross and so far the influence of the mother parent and male parent seem to be about equal if reciprocal crosses are made. Several hundred trees from this hand pollination have

yet to fruit. So far the one fact that has come out most prominently is that if one desires to obtain a seedling of high quality, it is desirable to use two varieties with high quality. If one is high quality and the other low the resulting cross will not, as a rule, be high enough in quality.

I could spend more time in describing the results of our work with apples, but time will not permit. In the United States there are a number of workers endeavoring to obtain apples specially suited to the climatic conditions of their particular parts of the country. At the Agricultural Station at Geneva, New York, they are working to obtain winter apples of high quality. In Missouri combinations between Ben Davis and Jonathan have been obtained and it is hoped some of these will be particularly suited to the climatic conditions there. In Iowa they are seeking for apples which will bloom late in the spring and thus escape the spring frosts which are often so injurious there. Thus each one is trying to solve his own problem and develop apples for his special conditions.

It will not be possible to discuss the other fruits in such great detail as the apple and not so much work has been done in Canada with other fruits.

Hardy Plums.

The plum offers a fine field for work. In Canada our greatest effort so far is to obtain hardy varieties which will succeed in places where few, if any, named ones have done well. Not only is it necessary to obtain varieties which will be able to withstand the cold of winter, but in many parts of the country extreme earliness is necessary to ensure their maturing before the severe frosts of autumn. At Ottawa the season is long enough to mature most sorts of plums, but the winters are too severe for the trees. The trees of some varieties of the European plums are hardy enough but the fruit buds are destroyed, hence for satisfactory results we have had to rely on the improved American plums.

The European or Domestica plum may be crossed with something hardier that will ensure hardy trees and good crops of fruit, but seedlings of it do not show sufficient hardiness. If the American plum could be crossed with the European, no doubt some very

desirable plums would be obtained but, so far as we are aware, this has not been done successfully. The Japanese Plum, *Prunus triflora,* will, however, cross with the American and one of the most useful plums now growing at Ottawa is the Omaha a hybrid originated in Nebraska. The flower buds are hardy and the fruit ripens early and combines the qualities of the Japanese and American. No doubt, there will be many useful plums for the colder districts originated as a result of crossing these two species. A few have been originated at Ottawa already.

The Canada plum, *Prunus nigra,* which grows mainly in eastern Canada and the north-eastern states is a more promising species to work with than the common species of the Middle West *Prunus americana.* The latter has, as a rule, a very thick skin while the former has a thin skin and is better for canning and preserving on this account than *Prunus americana,* although the latter is, as a rule, better in quality. The tree of *Prunus nigra* is much tougher than *P. americana* and does not break down from snow and ice in the winter the way *P. americana* does. Some of the earliest plums such as Cheney and Aitkin are varieties of the Canada plum. The fruit of local sorts of *Prunus nigra* is ripe early in August at Ottawa and a few growers are finding them very profitable to grow as they come on the market before the Domestica or European plums from any part of Canada. The only plums they come in competition with there being those from California, of which few are used for canning or preserving. It is believed that there is an excellent opportunity for improving this native plum and obtaining better varieties especially suited for the colder parts of Canada and the United States. The Minnesota Fruit Breeding Station is paying especial attention to the improvement of American plums as in Minnesota, Wisconsin, and the Dakotas this type of plum is particularly valuable.

Some of Luther Burbank's best productions are his plums which, although they do not seem to have a very wide adaptation, are particularly suitable for California and some of the other Western States.

Hardy Pears.

The pear is a fruit of which there is still an opportunity of developing varieties for special conditions. At Ottawa the only ones which have proved hardy and blight resistant are Russian sorts, such as Kurskaya and Zucherbirn, but they are so inferior in quality that they cannot be regarded as of much value in themselves, but these have been crossed with some of the best sorts of pears in the hope of obtaining good, hardy, blight resistant varieties. The trees are young yet, but something good is hoped for. New York State is also experimenting to procure blight resistant varieties, but the State of Oregon has, no doubt, the largest experiment under way. There they have got together a very large collection of varieties of pears and by inoculation with the germs of fire blight have found a few that are immune. It is hoped that in crosses of these and the best pears will be obtained varieties especially suited to those districts where fire blight causes much loss.

Hardy Cherries.

In Oregon, also, attention is being paid to the breeding of cherries, especially suited to Western conditions. The Bing, a sweet cherry which originated there some time ago, is one of the most profitable cherries for that part of America. At Ottawa seedlings have been grown of hardy Russian varieties, but none have proved sufficiently hardy in flower bud as even the hardiest of the Russian cherries only bear a crop occasionally, though the trees are quite hardy. Some species, however, may be discovered which is extremely hardy in flower bud which on being crossed with these Russian sorts will give something of value. A hardy bush cherry procured from the Arnold Arboretum some years ago, *Prunus tomentosa*, a native of North-eastern Asia is being used as a basis for new cherries at Ottawa, but has not been successfully crossed with the sour cherry.

Hardy Peaches.

Doubtless there are a number of workers in the United States trying to obtain peaches suitable for special conditions. Better shipping varieties are needed, peaches that are of high quality. In Canada the Experimental Station at Vineland is paying especial attention to the peach and is endeavoring to obtain varieties which will be better for special purposes than any of those already on the market.

Hardy Grapes.

There is a vast field for work with the grape. Rogers accomplished a great deal with very little labor, but years elapsed before very much was done by others to supplement it. The late T. V. Munson of Texas did a great work in combining the qualities of different species of grapes, and left some very fine varieties as the results of his labors. Some of his grapes are specially suited for Southern conditions, but his Manito, a very early grape, is proving useful as far North as Ottawa. Grapes above all fruits are much affected by a few degrees' difference in temperature, by the relative dryness of the air, and amount of sunshine. There are grapes which succeed in California which are of no value in the East, and grapes grown in Massachusetts that are of no value in the colder parts of Canada. New York State is breeding grapes for the East, and doubtless other States as well, and we may look to see the varieties grown at present gradually changed for something better. Some work is also being done in Canada. Large numbers of seedlings of Rogers hybrids are being grown there in the endeavor to obtain better sorts. The frost grape, *Vitis riparia*, grows as far North as Manitoba and offers a hardy parent. Some decided improvements were made on this years ago in Canada in the varieties Brant and Canada, two sorts which ripen in the coolest seasons at Ottawa and it is in procuring more and better grapes which will mature in comparatively cool weather that the opportunity of the plant breeder lies.

Hardy Blackberries.

The blackberry is a delicious fruit, but little has so far been done so far as we are aware in developing varieties for special conditions. The wild species of this fruit does not extend as far North as those of the raspberry, currant, gooseberry, and strawberry, and the cultivated blackberries that we have did not come from the most Northern types with the result that none of these are perfectly hardy at Ottawa and in many other parts of Canada and the colder parts of the United States. Quite recently we have collected wild plants in the neighborhood of Ottawa where the blackberry is near its Northern limit with the purpose of crossing these with the hardiest of the named varieties. There should be such fine varieties as Kitatinny and finer, that would be perfectly hardy as far North as the wild types extend.

Hardy Raspberries.

The wild red raspberry extends as far North as the Arctic Circle in Canada and yet little has yet been done to obtain raspberries as good as Cuthbert which will be quite hardy without protection everywhere where the wild one succeeds. The Cuthbert has a very wide adaptation in the more temperate parts of the United States and Canada, but who will say that better varieties will not be obtained which will be more adapted to special conditions. The Brighton and Count are two early raspberries originated at Ottawa which are among the hardiest tested there and the Herbert originated as a chance seedling with Mr. R. B. Whyte of Ottawa is the best main crop variety for that climate. Here again the local sorts seem more adapted than any others which have been tried. Prof. Hansen of the South Dakota Experiment Station has selected the Sunbeam out of a large number of wild seedlings as being especially suited to prairie conditions, while on the Western Coast the Loganberry, a hybrid between the raspberry and blackberry, originating out there, succeeds much better than in the East.

Hardy Gooseberries.

How little has been done to obtain gooseberries adapted to special conditions. In most places in America the English gooseberries mildew badly and it would be a fine thing if there were varieties originated which would be immune to this disease, no matter how adverse the conditions were. Such reliable American varieties, or hybrid gooseberries, as we have were originated some time ago. The Downing, and a Canadian variety very much like it, the Pearl, among green gooseberries, and the Josselyn or Red Jacket another Canadian gooseberry among red skinned varieties, are among the best for the East, but these do not succeed under cold prairie conditions, the old Houghton being found much hardier. In the Western States the Oregon Champion is the popular sort. Not only must varieties be immune from mildew but they must be able to withstand the heat of the sun in other districts and not scald as some gooseberries do today in certain places.

Hardy Currants.

The red currant is not so important a fruit in the East as it is on the plains to the West and North where its great hardiness makes it one of the most valuable fruits. The large fruited varieties of the Fay and Cherry types at present on the market are much tenderer than the smaller ones of the Red Dutch and Raby Castle types. The former were evidently derived from stock of the red currant from near its southern range in Europe and indeed the Cherry currant probably originated in Italy. It was introduced thence into France and fruited there in 1843 and was subsequently brought to America. Fay originated in 1868 with Lincoln Fay, Chautauqua Co., N. Y., and was introduced about 1883. It is probably a seedling of the Cherry. These varieties, although among the largest fruiting sorts, are not quite hardy at Ottawa and the crop from them is small. Considering the difference in size between these large fruited currants and the Red Dutch there is great room for the development of larger fruited hardy sorts especially suited to cold climates. The quality of currants could also be much

improved if acidity of some sorts were moderated and by obtaining varieties of better flavor. The Moore's Ruby is not so acid as most varieties nor are some of the white sorts as acid as the red. There seems to be no good reason why the size of the currant should not be much increased, but very little work seems to be being done in breeding better currants, certainly little has been done in Canada.

Black currants are very popular in some parts of America and are particularly popular in certain sections of Canada, and at Ottawa are much more profitable to grow than the red. They are used for jam and jelly and are said to be very useful in moderating colds. Comparatively little seems yet to have been done in developing new varieties of this fruit, although the Boskoop Giant, one of those most recently introduced, is a long way ahead of the old Lees Prolific and Black Champion both in size and quality. When such a marked advance has been made there seems good ground for believing that further advances are yet to follow. Larger fruits and larger bunches may be looked for and the flavor which in the best varieties is very agreeable to many people will, no doubt, be much more refined. The wild American species of black currants, *Ribes floridum* and *Ribes hudsonianum*, extend into very cold parts of Canada and hybrids between them and the cultivated varieties of *Ribes nigrum* may result in combinations which will be very desirable. The black currant was a very popular fruit with the late Dr. Wm. Saunders at Ottawa and as a result of his labors we have a number of very hardy and productive black currants of good quality that are proving very acceptable in the colder parts of Canada.

Hardy Strawberries.

And now we come to the last fruit which will be referred to in this paper, the strawberry, the most popular fruit of all. Everyone, we think, will admit after tasting the Marshall and Wm. Belt strawberries that most of the other varieties of which there are several hundred are far below the standard of these fine sorts and the best English varieties. Most of the more productive strawberries in America are inferior in quality. They are too acid and

are lacking in flavor. The Marshall is a poor plant maker, is not very productive, as a rule, is tender, and the Wm. Belt, at least with us, is not sufficiently productive. There are, of course, a few other varieties as good in quality perhaps, as these but they are lacking in something. In parts of America where the climate is hot and dry deeper rooted sorts are needed that will withstand such conditions. In parts where the climate is wet, firm sorts of good quality are desired that will withstand heavy rains. In places where there is little snow in winter but great cold, varieties are needed that will withstand extreme cold. Where the fruiting season is often dry, moderate plant makers are desirable as most of the heavy plant makers seem to suffer most in dry weather.

Certain varieties at present on the market are known to succeed better in some places than others. The Magoon, which is so popular in the Western States, does not do particularly well in the East. The Senator Dunlap has, perhaps, as wide an adaptation as any variety, but it is a heavy plant maker and does best, at least in Canada, where the season is relatively moist. There are a number of persons breeding strawberries for special conditions. Several private individuals have developed some good sorts. The New York Agricultural Experiment Station has originated some. Mr. Georgesson of the Alaska Station has for a number of years been breeding strawberries especially suited for the North-west Coast by crossing the native species with the cultivated varieties and some good sorts have been obtained especially suited for the conditions there. Great development has taken place in the autumn bearing strawberries largely through the work of one man, the Progressive variety being a great advance on the Pan American, for instance. At Ottawa we are crossing the cultivated sorts with the wild strawberry obtained from different parts of Canada in the hope of getting varieties especially suited for our conditions. Seedlings from the cultivated sorts alone have not given us just what is desired. The ideal variety of strawberry for each particular soil and climate should be somewhat as follows:

Perfect. Plant hardy, very productive, vigorous, making a moderate number of runners; must withstand drought well. Foliage large, abundant, rust resistant. Flowers borne on stiff stalks of sufficient length to keep the fruit well off the ground.

pollen abundant. Fruit, large to very large from beginning to end of picking season; form, roundish conical with a slight but not prominent neck, regular; calyx or hull small; seeds not prominent; color of uniform lively, deep glossy red from tip to stem; not showing scald readily; flesh firm, red, juicy with a tender core; subacid, sprightly, with a pleasant high flavor. Season, very early to very late or, in other words, all summer.

A berry of the foregoing description is not an impossible one to realize, and if those having strawberries to introduce would have the ideal strawberry more in mind, there might not be so many inferior sorts introduced every year.

I trust that I have been able to show that the development of fruits for special conditions is important and feasible and that already varieties are known which succeed better in one district than in another. I believe that every Experimental Station in the United States and Canada, and as many private individuals as can do so, should be endeavoring to originate fruits of all kinds especially adapted to their own particular needs.

SOME HISTORY OF THE GRAPE IN THE UNITED STATES.

By George C. Husmann, Washington, D. C.

Delivered before the Society, with stereopticon illustrations, February 19, 1916.

Sacred and profane history say the grape has ever accompanied civilization and was perhaps the very first of fruits cultivated by man, and has been his best stand-by ever since, improving with him and yielding finer fruit, better products, and a greater variety of them as the years pass by.

In this country records show that considerable wine was produced from native grapes in Florida in 1564. In 1607 Pale had established a vineyard of three acres at Henrico, North Carolina. In 1616 Lord Delaware urged the London Company to promote grape culture in Virginia, resulting in sending in 1619 for such purpose expert vine dressers and a collection of the best varieties of French grapes. Acts to promote grape growing were passed by the Assembly in 1619, 1623, and 1639. Wine was also made in Virginia in 1647, and in 1651 premiums were offered for its production.

John Winthrop, Governor of Massachusetts Bay Colony, had planted a vineyard on Governor's Island, in Boston Harbor before 1630. In 1633 William Penn attempted to establish a vineyard near Philadelphia. Attention to vine culture was given by English settlers in Uvedale, now Delaware, in 1648. In Maryland, Lord Baltimore is said to have planted 300 acres of land to vines. Charles II, in 1663, sought to encourage viticulture in Rhode Island by offering inducements to the colonists to grow grapes and make wine. In 1664 Col. Richard Nicoll, Governor of New York, granted to Paul Richard a privilege of making and selling wine free from all duty, he having been the first to enter upon the cultivation of the vine on a large scale. In 1710 Alexander Spotswood, Governor of Virginia, brought over a colony of German grape growers and

settled them on the Rapidan River. In 1770 an Act to encourage wine making was passed by the Virginia Assembly in favor of Andrew Estave.

Failures of early attempts to grow Vinifera in the Carolinas and Georgia were recorded by Alexander Hewitt in 1779. Much more data could be cited that during the 200 years in which this country was being colonized, the immigrants loved the vine and its products and continued to bring with them material of vines from their native land and experiments with such, in the hands of experts, were made on a large scale, but were failures nevertheless.

Of course no one then knew that the *Phylloxera Vestatrix*, or root louse of the vine, a native of this country, was omnipresent ready to destroy the vine plantings wherever made. It, therefore, remained for continual failures with Vinifera and a few accidental successful plantings of native sorts to direct attention to the latter.

A New Era in Grape History.

To Dr. James Meade is accorded the honor of first perceiving and setting forth in print the fact that American viticulture must rise from American grapes.

Just when and where the Scuppernong was discovered will never be known. The name appears to have been applied to it the beginning of the nineteenth century. It was, no doubt, grown much before then, and appears to be the first known American native grape variety. It has steadily increased in popularity, has been distributed to all parts of the Muscadine territory and today is the most extensively grown Rotundifolia.

The Alexander which appears to be a Labrusca hybrid, the real history of which is not known, is one of, if not the first cultivated American Euvitis variety. The Colony founded by Peter Lequax in 1793, at Spring Mill, near Philadelphia, and the Swiss Society founded in Kentucky, in 1790, of which John James Dufour was leader, members of which Colony in 1801 settled at Vevay, Indiana, failed in growing Vinifera varieties, but succeeded with the Alexander.

Bland, a Labrusca × Vinifera hybrid, was brought to notice by

Col. Bland of Virginia, the latter part of the eighteenth century. This is mentioned as having well ripened in New Haven, Conn., in 1820.

Isabella, a variety of Labrusca extraction, was introduced by William R. Prince of Long Island, New York. The origin of this is not definitely known. Prince, after nearly one-half century of experimentation with Vinifera, devoted the last years of his life to the growing and disseminating of native varieties.

Flowers, the oldest cultivated black Rotundifolia variety, was discovered by Popping Billy Flowers in 1819, in Flowers Swamp, Robeson County, North Carolina.

Mr. John Adlum, of Georgetown, D. C., brought the Catawba, the origin of which is also not definitely known, into notice in 1823. He wrote the first volume on American Grapes. In 1823 Adlum wrote to Nicholas Longworth, of Cincinnati, Ohio: "In bringing this grape into public notice, I have rendered my country greater service than would have been done had I paid the National debt."

Certain it was that the culture of native grape varieties gave a new impetus to the industry and such rapid progress made that in 1830 Prince in his treatise on the vine enumerates 88 American varieties.

Since then such varieties as the Norton in 1835, Delaware in 1850, Concord in 1853, and many others made their appearance. Grape culture had gradually increased and become general throughout the land.

Ephraim Wales Bull, of Concord, Massachusetts, is deserving lasting gratitude for originating the Concord grape, the most widely known, most generally planted, all purpose American grape yet introduced. It is included in nearly every collection where American vines are planted. To illustrate how important it has become I will state that in the Chautauqua Grape Belt on Lake Erie, 192,000,000 pounds of grapes were produced in one season, nine-tenths of which, or 172,800,000 pounds, were Concord. My Father, in his treatise on grapes in 1865, said, "One-third acre of Concord planted five years ago has produced me, during that time, in fruit, wine, layers and plants, the round sum of $10,000.

The Creator has blessed this country most abundantly by giving it more native species of grapes than all the other countries of the

world combined. This has enabled America in her native grapes, not only to give to the world new fruits, but our native species being resistant to the *Phylloxera Vestatrix*, or root louse, of the vine, also serve as grafting stocks on which to grow the non-resistant Vinifera varieties and through this has saved from destruction the vineyards of the world.

Glancing over the long list of names of originators and introducers of American grapes, more than one hundred prominent names are found, among these such names as T. V. Munson, E. S. Rogers, J. H. Ricketts, E. W. Bull, G. W. Campbell, Dr. J. Stayman, J. Burr, A. C. Caywood, T. B. Miner, T. Huber, J. Rommell, N. B. White, D. S. Marvin, C. S. Copeley, Dr. L. C. Chisholm, J. Moore, W. H. Lightfoot, S. Underhill, and many others.

Reflecting that the many cultivated varieties, adjusted to the climatic, soil, and other conditions of the old world suited to all the purposes for which grapes are grown, are varieties of one species, we can not estimate the tremendous viticultural possibilities of this country which so far as is known has more native species within her confines than all the rest of the world. Pathfinders in viticulture might be compared to miners in search of precious metals. The pioneer grape grower usually prospects. One kind of land after another is tried with one kind of grape after another, resulting as mining does, in failures, good pickings, and successes. The object being always kept in mind until the goal is reached.

While what has been said was occurring in the States east of the Rocky Mountains, the Mission Fathers brought with them and successfully grew Vinifera vines in California. They grew grapes at the Missions for their own use only, the work being principally done by Indians. They had but one variety, the "Mission," which is grown to some extent in California now. It was introduced in Mexico in 1520, and brought to the California Missions as follows: San Diego, 1769, San Gabriel, 1771, Los Angeles, 1781, and Santa Barbara, in 1786. The Mission Vine exhibited at the Centennial Exposition was planted at Monticido, California, in 1795. It was 18 inches in diameter and in one season produced over five tons, or 10,000 pounds, of grapes.

From the Missions the pioneer grape growers of California received their inspiration as well as start of cuttings.

The first direct importations to California of Vinifera from Europe were by nurserymen in 1853 and 1854. In 1861 A. Harassthy was commissioned by Governor Downey to visit Europe in the interest of the improvement and growth of the grape vine in California. He selected and brought with him cuttings of nearly all the better European vine varieties.

Some Remarkable Vines.

In American grape history there are three varieties of remarkable records, each of which has been the most prominent variety of its kind.

Of Vinifera, the Mission for its wonderful adaptability, and as a general utility grape, has never been surpassed.

Of American Euvitis, the Concord is the best known, the most generally planted all purpose grape so far.

Of the Muscadines, the Scuppernong always has, and still is considered the best and more vines of it have been planted than of all other Muscadines combined.

A Mission vine planted in 1842 by a Spanish woman, ten miles south of Santa Barbara, near Carpinteria, California, was considered to be the largest vine in the world. Its spreading branches supported on sixty posts covered 10,000 square feet of ground; 800 persons could comfortably gather under its shade. The first election in Santa Barbara County under American rule was held under it. In one season it produced 12 tons of grapes. The trunk of the vine measured 9 feet 7 inches in circumference.

In the Santa Barbara Daily News and Independent appeared the following: "Carpinteria, May 4, 1915. F. S. Barrick moved the big grape vine from the Peterson Ranch to the Aliso school grounds yesterday, and it is now ready to be placed in the base of cement which is yet to be prepared. As soon as the vine has been set in the cement and properly propped, it will be covered with creosote which will preserve it for many years. The branches were cut off at a length of twelve feet from the trunk which will give the visitors an idea of the immensity of the vine when it was alive. Grape vines are to be planted underneath the ends of these branches and in time will cover the old vine and give it the appearance of having life."

A wild grape vine about one mile north of Daphne, Alabama, is called the "General Jackson Vine" because General Andrew Jackson twice pitched his tent under it during his campaign against the Seminole Indians. This vine, in June, 1897, was reported to have a circumference of 6 feet, 1 inch, at its base, and estimated to be more than 100 years old.

The "Mother Scuppernong Vine" on Roanoke Island, tradition relates Amados and Barlow transplanted there from the mainland on their first voyage in 1584. Doubtless there are native vines much older. It is difficult to estimate the age of vines because the yearly growth is not distinctly marked.

In extensive travels among vast numbers of native vines abounding in our forests, I have never seen one that died from the effects of old age.

As old world history tells us of vines 600 years old, of vineyards remaining good 300 years, and vines 100 years old being considered young, it would appear there has not been time to ascertain the age vines will attain in this country, had Columbus started such records when he landed in 1492.

Beginning of a Commercial Industry.

Summing up we find that as a real industry viticulture in this country began to assert itself about the middle of last century in all portions of the country where it is an industry now, and as such is, therefore, as yet in its infancy.

Nevertheless, unfermented juices, choice wines, dry and sparkling, are made from American grapes and a large table grape industry has been developed in the Eastern States, whilst the Pacific Coast has entered into direct competition with the choicest European wines and other grape products, has captured the raisin market of this country, and is developing a fine trade for Vinifera table grapes. The efforts of Adlum, Longworth, and others were followed by others, especially in New York, Ohio, Missouri, Virginia, Indiana, Illinois, Kentucky, Pennsylvania, the Carolinas, and Michigan. In California where the Mission had so far been the only variety cultivated the choicest Vinifera varieties for all purposes are grown.

In 1850 the country produced almost 250,000 gallons of wine. In 1860 the product had reached over one and one-half million gallons and all the States and Territories, except four, were growing grapes. The Census of 1860 shows California, New York, and Ohio as the three leading wine producing states. In 1870 Missouri produced more than any other state excepting California. From 1875 on quite a decline occurred, owing to black rot and other diseases. With the one exception mentioned, California, New York, and Ohio have taken the lead in grape growing until the last census when Michigan surpassed Ohio.

It was from 1870 to 1885, when the greatest profits ever made by grape growers in this country were realized, that the growers prided themselves in growing superior grapes of the best varieties; wine makers tried to surpass each other making the finest wines; and raisin growers to produce the choicest raisins. Through this localities became and are still known for their speciality. As for instance, east of the Rockies the Kenka Lake District for its sparkling wines; the Chautauqua District for American table grapes; the American Dry Wine Districts of Missouri, New Jersey, New York, and Ohio; the Muscadine District of North Carolina; while west of the Rockies, the Raisin Districts in Fresno, San Diego and Yolo Counties; Table Grape Districts in Sacramento and San Joaquin Valley; Dry Wine Districts of Napa, Sonoma, and Santa Clara Counties; the Sauterne District in Alameda County; Sweet Wine and Brandy Districts in the San Joaquin Valley; etc.

Ups and Downs.

During the last quarter of the nineteenth century the grape history of the United States has been a series of ups and downs, until it appears now to be getting on a more substantial footing. For instance, in some of the Eastern States grape prices in basket lots have varied with years from 3 cents to $\frac{3}{4}$ cent a pound, to bulk grapes from $30 to $4 per ton. In California bulk grape prices have varied from $35 to $40 a ton down to $6 and even less, and hogs were turned into the vineyards to harvest the crop.

Black Rot, anthracnose, insect pests, etc. wrought havoc in the

Eastern States, against which the vineyardists did not then know how to cope, while in California Phylloxera and the California vine and other disease injuries wiped out thousands of acres.

Past experiences have been such that many former enthusiasts quit grape culture. This is why some sections of the country formerly important grape sections are not growing so many grapes now, although there are now new plantings made and decided interest shown all along the line. While these experiences have given sorrowful lessons to many, knowledge has also been gained through them that could not have been obtained in any other way. After years of successes and reverses, crop shortages and productions to exceed wants of the markets created, the industry in the East, as well as in the West, has gradually settled down to a more solid business basis.

American grape products have taken high honors at all important International Expositions, including the one at Paris in 1900; they are not only rapidly replacing products of like nature formerly imported from abroad, but our grape products are rapidly finding their way into all the principal markets of the world.

Viticulturists in the United States have come mostly from two sources, namely: those born in this country, few of their antecedents having followed viticulture, they therefore having it all to learn, or, they are viticulturists from other countries, who after coming here, find it more difficult to wean themselves from set notions and adapt themselves to new conditions than beginners do to learn the trade.

Viticulture in the United States may at present be said to consist of three distinct regions, which segregate themselves by the grape species grown in them for commercial purposes. These are:

(1) The Vinifera region, in which the Vinifera varieties are grown for all the various purposes, is located almost entirely west of the Rocky Mountains, and so much of it in California that it might almost be said to be a California industry; at least 75 per cent of the entire grape output of the United States for various purposes being of Vinifera varieties. Nearly 100 per cent of the raisins and grape brandies produced in this country come from California.

(2) The Muscadine region, in which improved varieties of

Rotundifolia and Munsoniana are grown for commercial purposes. This region is found in the South Atlantic and Gulf States and along the lower Mississippi Valley, extending from Maryland, south to Texas on the west, thence north along the Mississippi River, to Southeast Missouri and Tennessee.

(3) The American Native Grape region in which improved varieties of American Euvitis are grown for table grape, wine and unfermented grape juice purposes. This is scattered over the entire United States east of the Rockies and west of the Alleghany Mountains, but carried on extensively in the States from the Hudson River west and north of the Ohio River and that border on the Great Lakes and in the more centrally located states of the Mississippi Valley. The great bulk of American champagnes and dry wines and unfermented grape juices come from this region.

Department Researches.

The United States Department of Agriculture through its Viticultural Investigations, is endeavoring to make itself useful in a broad way, in assisting in the proper development of the industry of the entire country.

These researches are demonstrating in the American Euvitis region that the failures made by the grape growers in the past were largely due to lack of knowledge, and showing what the causes of the failures were, that these can now be overcome. The investigations are assisting in the re-establishing and proper adjusting to conditions of a once pretty extensive grape industry, that had gradually been declining for years on account of lack of proper cultural, training, pruning, and spraying methods, prevalence of grape diseases and insect pests, and lack of knowledge by the growers of the best means of counteracting and eradicating such evils.

In the Muscadine regions we are determining the best methods of planting, cultivating, training, pruning, and utilizing the product of Muscadine grapes, with particular reference to determining the adaptability of varieties and the discovery, origination, and dissemination of new varieties.

An exhaustive research into the self-fertility and sterility of the

species has been made and remarkable successes have accompanied our breeding investigations, resulting in self-fertile vines, the first of their kind so far known, as well as a number of remarkably promising crosses between Rotundifolia and Vinifera and American Euvitis. Our pruning and training experiments bid fair to revolutionize the methods heretofore practiced with Muscadines.

In the Vinifera regions, we are making a comprehensive test of resistant varieties of vines to determine their adaptability to the different vineyard soils and climatic conditions; we are ascertaining the congeniality of the Vinifera to different resistant stock varieties; we are determining the varieties best adapted to different localities and uses; all classes of grapes are being tested with reference to their resistance to insects and diseases which have been doing serious injury to the vineyard, and if found necessary will undertake to originate an entirely new class of grapes better adapted to Pacific Coast conditions. These researches are well under way and a number of important determinations have already been made.

Growth of the Industry.

The recent growth of the industry has been remarkable as is shown by the following figures:

In 1901, 7,635 car loads; in 1914, 14,273 carloads of table grapes were shipped. In 1901, 31,050; in 1914, 49,685 cases of grapes were canned; in 1901, 74,000,000 pounds; in 1914, 196,000,000 pounds of raisins were cured. In 1901, 1,688,500 gallons; in 1914, 6,765,119 gallons of grape brandy were produced. In 1901, 37,250,000, in 1914, 48,900,000 gallons of wine and unfermented grape juice were made. In 1900, there were about 275,000 acres; in 1914, 450,000 acres in grapes. In 1900 value of crop about $14,090,000; in 1914, $41,500,000. In 1900, 1,300,750,000 pounds, in 1914, 2,750,000,000 pounds of grapes were produced. This shows that in a little more than a decade the Viticultural Industry of the United States has more than doubled itself and now represents an investment of at least $300,000,000, giving employment to 150,000 persons and yielding an income for grapes and their products of nearly $50,000,000 per annum.

The total grapes produced for commercial purposes in 1914, if figured in carload lots, would mean a train of 137,500 cars. No other fruit industry in this country can show such a record. This in spite of all the difficulties encountered certainly pays a tremendous tribute of love for the vine.

Credits.

Of credits that should be placed to American viticulture I would mention the following. We are rapidly improving on the already good methods we have of packing, handling, storing and marketing of table grapes. We are not only producing all the raisins we consume but are becoming exporters of them. We are keeping pace with improved methods of fermentation, cellar treatment, and excel in methods of transporting and shipping of wines. The sparkling wines made in this country from American, as well as Vinifera grapes, are rapidly replacing those heretofore imported. The unfermented grape juice business has rapidly become an important speciality. We are making and consuming a number of new grape products.

In machinery for harvesting, handling, working grapes into products and transporting the same, we lead the world. What a wonderful change in equipment and great saving of expense in cellar management have been brought about through the must pump and what an expense in costly shipping cooperage will be eliminated by the shipments of wine in bulk or tanks aboard cars or vessels. We have learned to control our most formidable grape diseases and insect pests.

American native grape varieties as Phylloxera resistant stocks have been the means of saving the viticulture of the entire world. This and much else already accomplished speaks well for an industry as yet in its infancy.

Our viticultural investigations have about convinced us that we will soon know how to grow within our confines the forty to forty-five million pounds of currants we annually import and consume in this country, and why should we not also grow the two hundred and fifty to three hundred and fifty thousand barrels of grapes packed in sawdust, annually imported into this country. It has already

been demonstrated that specially prepared sawdust from the California Redwood makes an excellent substitute for cork-dust.

No other plant yields such an abundant annual crop for as long a series of years; neither is there a plant that can be successfully grown under such a variety of conditions at as small expense as the grape.

Future Possibilities.

If we will avoid errors and overcome obstacles met in the past by application of information gained by experience and researches since; if we study grape varieties, soils, climatic and other conditions, and plant vines with specific purposes in view and train, prune, trellis, fertilize, cultivate and otherwise care for our vines, so as to bring about best fruiting results; if instead of worrying the industry by trying to legislate people to be good, we educate them to appreciate the real merits and healthgiving and nutritive value of the grape and its many products; that the juices fermented or unfermented are natural beverages of intrinsic food value and promoters of temperance and health when taken in reasonable quantities; if instead of trying to produce quantity for a few of the bulk markets, we also work for quality and distribute our products more generally, so the consumer is not called upon to pay three or four times as much as the producer gets for it and so instead of as a luxury, they will be used as food and through this incidentally, but very directly, offering inducement to viticultural pursuits; if all interested in the industry will have more confidence and seek to help each other and all do something to develop and increase the sale and consumption of grapes and their product, remembering that there is no other fruit so delicious that can be used for so many purposes and that it always has and ever shall be considered the Creator's choicest gift in plant life to man; if we consider that all the cultivated foreign varieties come from the Vinifera, a single species, which also thrive in large areas of our domain; that we have more native species within our confines than all the rest of the world combined and no reason presents itself why varieties should not be cultivated wherever native vines are found, and some of these are found in nearly all parts of the country, it looks as though the viticultural possibilities that lie in store for the United States are almost unlimited.

GARDEN WRITINGS IN AMERICA.

By Leonard Barron, Garden City, N. Y.

Delivered before the Society, February 26, 1916.

The development of strictly garden writings in America is a very recent growth, so recent, indeed, that it may be claimed as a feature of the last twenty-five years. Although gardening books have been published in America in fairly considerable numbers from the very beginning of the country, still many of these have been of European origin. It has been a common practice to import sheets of English books and to bind them up in this country, with a special title page and an American publisher's imprint. In other cases, the plates have been imported and an edition put out over here. This has led to much confusion in the past and we can lay claim to have produced only very recently any strictly American writings on the fine art of garden craft — writings that really reflect the native spirit. This, however, has been but a natural reflection of the condition of the art of garden making itself.

The written word is the permanent record of events, and there is yet much work to be done in the study of our garden writings from an historical point of view. Those who are concerned with this phase of the question will find the most comprehensive review to date in the third volume of the new *Standard Cyclopedia of Horticulture*. That the literature of our American gardening should be thus flavored with foreign lore up to very recent times is nothing to be surprised at, since not only were the beginnings of American garden craftmanship based on the practices of England and the continent, but also the actual materials — the plants — employed were imported; and indeed an overwhelming proportion of our early practitioners gathered their experience abroad before coming to these shores. This City of Boston is inseparably associated with the beginnings of gardening here in America, of which fact the organization under whose auspices we are now gathered is in itself sufficient proof; and today this section of the country still

stands as perhaps the most advanced center of garden interest in the United States.

It is not my intention today to call your attention to the best books, so much as it is to direct it towards a consideration of the tendencies of contemporary garden writings and publications, in an effort to measure up our possessions and our needs.

The literature of gardening and horticulture in this country dates back but a little over a hundred years, for it appears that the first purely American book written from an American point of view was Squibb's *Gardener's Kalendar for South Carolina and North Carolina*, Charleston, 1799, which ran into several subsequent editions. This was followed in 1804, in Washington, by *The American Gardener*, of John Gardiner and David Hepburn. This volume also had several editions. But prior to this latter there was published in Boston an edition of Marshall's *Introduction to the Knowledge and Practice of Gardening* (1799). The bad example here set of republishing a foreign work has continued to this day and has, I believe, had much influence in confusing the home gardener and hindering real appreciation in garden work. To the professional gardener or horticulturist, these books are decidedly useful; but for the amateur gardener, they have been somewhat of a handicap because he was not in a position to interpret them in the light of reason. Thus the very effort to promote popular interest in gardens has at times reacted to its disadvantage.

A glance over the bibliography of horticulture in America reveals curious and interesting developments; and through it we see reflected the progress of gardening to the present day marked revival,— or shall I say evolution? — into a real garden spirit that we all recognize. The garden proper is an enclosure, an intimate part of the home surroundings, and with the early settlements came the old-world desire to develop this appurtenance of the home. But economic conditions soon made their influence felt and the garden idea quickly gave way to that of broader, more open cultivation of crops in fields and orchards. As a consequence, horticulture in its broader sense came to be the dominating character. Attention was concentrated on the utilitarian aspect rather than upon the aesthetic. Fruit growing overpowered everything else and, indeed, became so dominant that the word horticulture is

generally accepted as indicating pomology. This tendency began to manifest itself as early as 1802, when Cobbett's edition of Forsyth's *Treatise on the Culture and Management of Fruit Trees* appeared in New York and Philadelphia, but the first truly American book on fruit growing appeared in 1817 — Coxe's *View of the Cultivation of Fruit Trees.* Thatcher's *American Orchardist* appeared in Boston in 1822. From that time onwards, for fifty years or so, pomological works appeared in plenty and completely dominated horticultural literature.

Then came the Civil War, and a marked cessation of literary production in this particular line as in everything else. Since the collection of American books on horticulture and gardening has received so little attention in the past, we have very few sources from which to draw information. The two most excellent collections are that of the Massachusetts Horticultural Society and the private library of Dr. L. H. Bailey, whose account of these earlier North American horticultural books is undoubtedly the best available and whose data I accept:

"In the introduction to the *History of the Massachusetts Horticultural Society* (1880), it is said that 'Mrs. Martha Logan, in South Carolina, when seventy years old, wrote a treatise on gardening called the *Gardener's Kalendar* which was published after her death in 1779, and as late as 1808 regulated the practice of gardening in and near Charleston. She was a great florist and uncommonly fond of a garden.' In the Charleston library there is no separate book of this kind, but the *Gardener's Calendar* by Mrs. Logan appears in succeeding issues of the *Carolina and Georgia Almanac,* comprising six pages. The earliest date there available is in the Almanac for 1798. It has been spoken of as a pamphlet, and it may have been reprinted separately. The first almanac printed in South Carolina was Tobler's for 1752. This almanac contains a '*Gardener's Kalendar,* done by a Lady of this Province and esteemed a very good one.' Perhaps this work was by Mrs. Logan. There does not appear to be any book by Mrs. Logan in the antiquarian libraries or lists, although Evans apparently erroneously included it in Vol. IV of his *American Bibliography* as of the date of 1772. Mrs. St. Julien Ravenel, in *Charleston, the Place and the People* (1906), writes that 'Mrs. Logan was the daughter of the

gallant Colonel Daniel.' Her *Gardener's Chronicle,* written when over seventy, was in great demand formerly, but seems to have utterly perished, the most careful search failing to produce a copy.

The almanacs were important mediums of information in the early days, and it is probable that some of the first instruction in gardening was given in them. In *Poor Will's Almanack* for 1787, printed in Philadelphia in 1786, there is a *Gardener's Kalendar, or useful memorandums of work necessary to be done, monthly, in the gardens and orchards of the Middle States.* The *Southern States Ephemeris* for 1788, printed in Charleston in 1787, contains a 'new and copious gardener's calendar' for the southern states. In Isaac Brigg's *Georgia and South Carolina Almanac* for 1800, printed in Augusta in 1799, there is a calendar by Robert Squibb. The agricultural matter in the New England almanacs is well known.

"In 1796 there was printed at Newburyport, Mass., by Blunt and March, for John Dabney, Salem, *An Address to Farmers* on a number of interesting subjects. It contains a part or chapter on the character of a complete farmer; one on the profits of a nursery; another on the advantages of an orchard.

"Apparently the earliest separate book on a horticultural subject published in North America (if the Logan is not counted), was Robert Squibb's *The Gardener's Kalendar for South Carolina and North Carolina,* published in Charleston in 1787, and again in 1809, 1827, and 1842. The second work appears to be the American edition of Marshall's *Introduction to the Knowledge and Practice of Gardening,* Boston, 1799, already referred to. The second indigenous book apparently appeared in 1804, *The American Gardener,* by John Gardiner and David Hepburn. It was published at Washington. This book apparently had an extensive sale. It was revised by 'a citizen of Virginia' and republished in Georgetown, D. C., in 1818. A third edition appeared in 1826.

"This book was followed in 1806 by Bernard M'Mahon's excellent and voluminous *American Gardener's Calendar* in Philadelphia. This work enjoyed much popularity, and the eleventh edition appeared as late as 1857. For fifty years it remained the best American work on general gardening. M'Mahon, remembered in the Mahonia barberries, was an important personage. He was largely responsible for the introduction into cultivation of the plants collected by Lewis and Clark.

"These early books were calendars, giving advice for the successive months. They were made on the plan then popular in England, a plan which has such noteworthy precedent as the excellent *Kalendarium Hortense* of John Evelyn, which first appeared in 1664, and went to nine regular editions. Other early books of this type were An Old Gardener's *Practical American Gardener*, Baltimore, 1819 and 1822 and Thorburn's *Gentleman's and Gardener's Kalendar*, New York, the third edition of which appeared in 1821."

It is of interest to note the marked importance of the South in those earlier days. Again this emphasizes and illustrates the English influence on the beginnings of American gardening, for the settlements of North Virginia and New England trace their connecting lines back to one common source. That the ultimate garden spirit, as we preach it today, should have its greatest accentuation in and around Boston is not to be remarked as wonderful; it is but the working out of inevitable economic and political laws. The Dutch settlement of New York, lacking the soul and spirit of these other garden sections, has failed to leave any impression of itself on our American gardening today.

It has already been pointed out that the earlier writings, so far as the records show, were of the general character of calendars. We might, then, work out a Development Chart of our garden writings something like this:

Past	Compendium or Didactic	Calendrical Topical Text book
Present	Expository	Subjective (one garden) Objective (gardens in general)
Future	Record or Descriptive	Special treatises Reviews and Imaginative

These classifications are arbitrary and not exact, but they will serve as a basis for discussion. As a matter of fact, they overlap largely in all directions.

To proceed with details. All the earlier publications fall into

the first of these divisions, being merely concerned with the practical work of the moment — what, when, and how to plant or cultivate. The highest development of this class is the text book, which is a present day development and has attained a greater perfection in America than elsewhere. So fast, indeed, have volumes of this type succeeded one another within the last few years that they now form a very considerable group by themselves.

Both the Calendrical and the Topical books are the product of the practical worker who lays down a rule of practice based on experience, but one which he does not, because he too frequently cannot, explain. The text book, equally didactic, is, however, based on principle and reason; it is obviously a natural development of and from the two former types. The period of text book writings has, I feel, reached its zenith, but other books of a more imaginative type have reborn the interest in garden work and are making it something far ahead of what it was a hundred, fifty, or even twenty years ago. The appearance of this particular kind of writing has been marked by the development of a new type of garden writer — the skilled observer scientifically trained — the professional teacher or experimentalist. Is there a danger signal to be hoisted here? Is there not a possibility of the loss of something valuable in the very evident tendency of the modern practitioner to refrain from putting his experience and observations into some permanent form? While we need the teacher, and welcome him, do we not also need the matured conclusions of the worker whose experiences are an end to themselves? It was largely by his contributions that the garden craft of the past was enriched; it is his writings we need now, and which future students will need in order to understand and measure up the conditions of today, just as we ourselves try to reconstruct the past by studying the writings of the old timers.

The second group, of Expository writings, approaches more closely to the domain of fine literature, and several volumes of recent date have successfully reached a large circle of readers. In this category I submit, as examples,— not necessarily as the best representatives of this class — *The Garden of a Commuter's Wife* (Mrs. M. O. Wright), *A Woman's Hardy Garden* (Ely), *The Well Considered Garden* of Mrs. Francis King, and *What England Can Teach Us About Gardening* by Wilhelm Miller.

Here, indeed, is a wide field for development, and one which perhaps most concerns our present purposes. This type of writing, in connection with the third group of Record and Description, is suggestive of the future of our writings.

Would that we had many more of this class of book which reflects the sheer joy and delight of the living companionship of the growing plants, the fascination of nursing the tender exotic, the rapt delight of opening spring and ripening autumn. These books treat not of gardens as things apart, but as integral elements in the round of our daily existence. The appearance of several such within the last few years is a reflection of rapidly changing conditions of our environment.

Though to the contemporary teacher and student these writings have perhaps only a moderate value, yet they are strongly significant of the new garden spirit that is enveloping all America. Let us encourage them by every means in our power for they are spreading the gospel of popular home gardening, of personal gardening, like that which is recognized as having existed in England for a long time past, so that it has come to be a recognized habit to compare the garden interests of the two sides of the ocean, to the disadvantage of our own.

Just as real, permanent progress in our widespread American horticulture (of the garden) must rest on the development of the amateur as distinguished from the mere trader, so, too, must we look to a literature of enthusiasm based on the amateur's keen interest in others of the same class to develop and at the same time to reflect the present-day condition. Authoritative gardening writings come to us from England today even as in the earlier times. But as yet we send very few thither. Still I have not the least doubt in the world of our ability to eventually produce our counterparts of Miss Jekyll, Miss Willmott, Reginald Farrar, Joseph Jacob, and others too numerous to name, but all of whom have given the world garden books based on personal experiences and enthusiasm. Keenly critical, too, they are monuments marking the progress of our delightful craft. This, of course, presupposes the existence of competent authors, well informed amateurs, to make experiments, suffer trials and disappointments, achieve successes, and then chronicle them.

I believe in the future, though conditions of garden lore in England and America are not now the same. It may indeed be said that a knowledge of gardening is a necessary part of a liberal education across the sea, whereas with us an intelligent acquaintance with gardens is indeed quite exceptional. How many American ladies will naturally invite you to stroll around their gardens to see the latest novelty in herbaceous plants, or the newest shrub from China? How many American men will invite you to stroll into the conservatory or greenhouse after dinner? Until these things or something like them happen, garden writings of the expository kind cannot be successfully produced among us because the publishers cannot afford to produce them for an unresponsive public.

As forming the third great class are the writings of Record, Description and Imagination. Here we look for the highest type of work, both as regards subject matter and method of presentation, literary quality, not mere manufacturing perfection (for a worthless book may easily be launched on its way with all the superlative trimmings of the publisher's art. Good looking covers do not necessarily mean worth-while contents). This type of book may be called the book of the future; yet that it will come is certain. Indeed, the beginnings may be said to be here. As examples of recent publications that more or less answer this requirement I cite Thomas's *The Practical Book of Outdoor Rose Growing, The American Flower Garden* (Blanchan), and *The Garden Blue Book* of Holland. Books of record carefully written in the light of all contemporary available knowledge, yet inspirational and practical, are the ideals that we set before us. That there are differences in character and calibre, great differences, as between the first and the last types of book is evident. To exactly grade these differences is a difficult task and the effort here made is open to criticism.

The transition of garden literature has been from the dogmatic and empirical through a few topical volumes to the teachers' text books and manuals of commercial interest, to the finer inspirational writings that are just looming upon us. First the practical worker, then the trader, followed by the investigator and teacher and the enthusiast who gardens for pure joy.

It would seem that much of the ultimate writings of gardens are to be done by women. Modern women writers who are addicted

to the garden habit are, however, following an ancient precedent, for have we not seen that the earliest *Kalendar* of all, the very beginning of our subject, was by that "great florist, uncommonly fond of a garden, Mrs. Logan of Charleston"; and I am glad to note this present-day tendency for I do sincerely believe that it will be women of America who will give to American gardening its real stamp of aesthetic individuality. Women as garden writers are also making an impression abroad.

A significant factor to be borne in mind is the influence of the garden clubs, the membership of which is composed almost wholly of women. These organizations are serious and from their membership is bound to come a new body of observers and recorders. I look to a very strong influence from this direction on our garden writings in the very near future. Indeed, the beginnings are already with us. Mrs. King, of Michigan, has already published one book, her writings in the periodical press are familiar, and her activities in garden propaganda in general are well known. Similarly, we may recall the names of Mrs. E. A. Stokes Peckham of New York, Mrs. J. M. Patterson of Virginia, Mrs. F. N. Doubleday (Neltje Blanchan) of New York, and Miss Louise Shelton of New Jersey, as pioneers in the new amateur garden movement whose writings of gardening are already bearing an influence.

It has been my privilege to address a considerable number of these garden clubs, and I am able to bear personal testimony of the intensity of purpose, and of the frequently well-informed status of the members. And this group of people is raising up among us a new class of readers whose requirements must be met adequately in contemporary garden writings. Here will come the demand for writings of the third class.

The activity of book productions reflects very exactly the general conditions of the country. This can be clearly seen in studying the chronology of our subject. It would almost seem indeed that garden writings can be charted into a very true curve of the general business situation; for quite apart from the natural growth in volume as time progresses we can trace very interesting and illuminating fluctuations.

In times of progress and great business activity the presses deliver a greater number of different works than in the intervening periods

of depression and stagnation. In the total publication list of approximately a thousand titles up to the end of last year, we find that practically one-half have appeared since 1890, or say within a period of twenty-five years; and that nearly one-half of that number, or twenty-five per cent of the entire production of American gardening books from the very beginnings of time, is encompassed within the last ten or twelve years! Wherefore I prefer to look into the future of things rather than to do more than call your attention to the past. And besides it is safer. Who can say what the future will develop?

A canvas of the publications of the last ten years reveals that out of about two hundred different titles issued and classified in the publishers' trade lists, within the class and group headings of Gardening and Horticulture, forty-seven, or about twenty-five per cent., are devoted to fruit growing, which evidently still claims a large share of attention; but various phases of pleasure gardening (apart from landscape work) claim a slightly greater proportion, being represented by fifty titles. Others are: Landscape, 11; vegetables and truck gardening, 31; literary, 13; children's garden work, 9.

Books devoted to technical landscape architecture are not considered in our present review, because although allied to gardening and having their origin there, still they deal with a subject matter that is becoming rapidly divergent and tending to form a special subject by itself.

It will be observed that our writings offer very few treatises devoted exclusively to one kind of flower or plant, although as long ago as 1828 the first American book devoted wholly to flowers appeared, assuming that Roland Green's *Treatise on the Cultivation of Flowers*, issued in Boston in that year, was really, as it seems to be, the earliest. This is a little volume of only sixty pages and is interesting as being possibly a fair reflection of the plants grown at that time. Naturally, many subjects that are now almost as household words among us, do not appear, and quite a number that do appear there are not very seriously considered today, as myrtle, camellia, fuchsia, passion flower. It would be well worth the while of modern-day enthusiasts who clamor for old-fashioned gardens, to look in the old garden books for the plants that they

must justifiably use. What a lot of modern-day favorites would be barred! One notable omission alone from this list is sufficiently suggestive — the phlox. The dahlia was favored with a treatise all to itself, appearing in Boston in 1839. Then came Buist's *Rose Manual*, appearing in Philadelphia in 1844 and on the same subject in 1846, Prince's and then Samuel B. Parson's Manuals. Both these books achieved a considerable degree of popularity. Rose books have been published occasionally ever since.

Of more recent other writings devoted to other special flowers, reference may be made to Ward's *American Carnation Culture*, Galloway's *Commercial Violet Culture*, Harrison Dick's *Sweet Peas for Profit*, and Holmes's *Commercial Rose Culture*, all of which it will be observed are decidedly of a commercial character. Doubleday, Page & Company's Garden Library contains small volumes on *Roses, Narcissus,* and *Water Lilies;* H. S. Adams has contributed a little manual on *Lilies;* and the Rev. C. S. Harrison has given us small pamphlets on *Phlox, Iris*, and *Peony*. But in a general way we are still dependent upon importations for specimens of this type of work other than those having a distinctly trade or commercial bearing. The book on the Dahlia just mentioned was followed more than fifty years later by a small treatise on the same subject, by Lawrence K. Peacock, now out of print. The fact remains that there is no great market yet created in America for these manuals of special plants. Here again we can only hope for, and look to, the future.

More important, perhaps, than the separate books, in reflecting the contemporary spirit in any subject, is its periodical literature, through which, week by week or month by month, ideas and thoughts are communicated. Not only are the serial publications more responsive to the contemporary impulse, but they also reach a wider audience, and that far more quickly. Whereas a fairly successful book of a technical or special character will be considered as doing well if it sells 2500 copies or from that up to 5000, in the four or five years of its greatest popularity, a well-established and successful periodical will reach from twice to ten times as many as that maximum, and do it every week or month as the case may be.

On the other hand, with few exceptions, the book is a better unit

for distribution and for collection. A book has a more permanent character. People instinctively save books while they destroy current journals and magazines, and they will pay more money for books.

The periodical literature of horticulture in North America has been vastly greater than the literature of bound books in the same field. There have been started from time to time, approximately 500 journals most, if not all, of which are but memories today. Associated with this class of publications must be included the reports and proceedings of various societies and associations, but in this type of garden writing the spirit which we are specially considering today has had very little place. The pomological and other fruit-growing interests have completely swamped the more intimate associations, the aesthetic side that deals with home surroundings. The reports of the "flower committee" or the "garden committee" are usually perfunctory documents of little or no practical value to anybody. With the exception of parts of the proceedings of the Massachusetts Horticultural Society, the Horticultural Society of New York, and some local Canadian Societies, there is very little of permanent garden interest to be found in these records. Special flower societies devoted to the gladiolus, the peony, the rose, the sweet pea, the carnation, etc., record from time to time matters of progress in their particular fields, and more permanent value has been given to some of these documents, through the coöperation of certain State Experiment Stations. Records of the introduction of new varieties may be found here and in the combined reports of these organizations included in the proceedings of the Society of American Florists. Here some attempt is made to keep a record of new plant introductions in so far as they are brought to the notice of the organization through registration.

A few of the garden clubs have separate periodical publications printed for circulation among their members only, and these contain some notes of a critical nature, that bear relationship to the imaginative and the record type of writings of which we have seen the beginning in some of the more recent books.

The periodical may be said to blaze the way for the book. It can feel the way and get a quick response; but more than this, the

periodical is the great engine for opening up and developing new lines of interest. From a strictly garden viewpoint the periodical publications of the past can be reviewed very quickly, for all the earlier journals regarded agriculture as their prime interest and merely permitted horticulture and gardening to trail along in their obscure little corners.

There have been only three or four publications with general, broad garden sympathies. *The Floral Magazine* began in Philadelphia in 1823, and contained colored plates of various ornamental plants. Report says that it was discontinued because it did not pay. It was conducted by the Landreths, nurserymen and seedsmen, as indeed were various subsequent periodicals devoted to plants, flowers, and gardens, evidently in the nature of altruistic contributions by commercial establishments made with the idea of extending and promoting the interests of the business in which they were directly engaged.

The Horticultural Register, supported by Joseph Breck, began in 1835 in Boston, as also did Hovey's publication, *The American Gardener's Magazine*, which soon becoming *The Magazine of Horticulture* and continuing until 1868, remains as one of the most interesting publications of the country. Thus to Boston again is added one more honor. Hovey was a nurseryman.

In 1846 appeared the first number of the next important publication, Downing's *Horticulturist*, in every way a splendid publication, reflecting adequately the best horticultural spirit of its period. This publication started as a little stream and, appearing in different forms in different cities, gradually grew in importance and received as tributaries numerous other publications. The *Horticulturist* can be traced in direct line of descent, with its absorptions, clear down to *American Gardening*, the publication that ceased to exist in 1904. It was edited successively by A. J. Downing, Patrick Barry, A. J. Smith, Peter B. Mead, and G. B. Woodward, names sufficiently well known in the horticultural and gardening annals of this country. Naturally, it began with a strong leaning towards pomology and gradually swung over towards the development of private grounds and the embellishment of gardens, considerable attention being paid to ornamental plants, trees, and shrubs. *The Gardener's Monthly* began in Philadelphia in 1859

and continued till 1887, reflecting from its pages the teachings and the great appreciation of plants of Thomas Meehan, its editor. This is straight line of descent of an honest effort of early professional horticulturists to introduce their wares to the public by a campaign of impartial education. In 1887, both the *Horticulturist* and *Gardener's Monthly* were absorbed by the *American Garden*.

The origin of the *American Garden* itself was from two independent sources of which the *Ladies' Floral Cabinet*, beginning in 1872 and issued from the office of the *Horticulturist*, was one. The basic idea of this periodical was that the cultivation of flowers was essentially an occupation for women. It was a fairly successful venture and represented a type of periodical that does not exist today. It was amateur and parlor gardening in its simplest and most elemental form. In 1880 the publication changed hands, and still again in 1882, when Ralph Waggoner assumed possession, with C. L. Allen as editor-in-chief. In 1887 it was absorbed by the *American Garden*, which later absorbed also the *Flower Garden*, edited and published by C. L. Allen and subsequently by Beach Sons & Company and B. K. Bliss.

It will be noted here that the proprietorship and management of these publications have been entirely in the hands of those interested commercially in the plant and seed trades.

With Bliss' ownership, Dr. F. M. Hexamer became editor and under his management the quality of the material published reached a higher plane, the contents being divided into definite "departments," as they were called, the whole publication, however, being a periodical calendar and notes on the introductions of the moment. In 1890 and for three years later, L. H. Bailey was editor. *The American Garden* at this period assumed definite magazine character, the subject matter being of the expository character with some attention to articles of record and description.

In 1892 *Popular Gardening* was absorbed. This was an *olla podria* of anything and everything that related to the growing of plants, fruits, flowers, and vegetables gathered from anywhere, but it had struck a really popular note. Its principal thought and aim was to stimulate the improvement of home grounds. This publication was itself an absorption of so many other lesser magazines from various parts of the country that it is quite bewildering

even to think of them. The combined *American Gardening*, as it was called, however, soon fell into bad ways, and gradually dwindled till publication was suspended in 1904. Simultaneously with the decease of *American Gardening*, *The Garden Magazine* arose, and I became associated with it in its second number.

There are essential differences between weekly and monthly publications and the kind of writings they convey. In the weekly periodical news, up-to-date comments on events of the moment, and chronicles of contemporary happenings demand the greater space. News has no part in a monthly magazine, but instead the subjective and expository treatment is all important. The news of what is happening in horticulture is catered to by four trade papers, with interests restricted essentially to the trade and profession. These are the *American Florist*, *Florists' Exchange*, *Florists' Review*, and *Horticulture*. We should not leave the field of past periodicals, however, without paying tribute to the notable effort inspired in this city and which launched the *Garden and Forest*, which ran from 1888 to 1897. This publication really set the highwater mark in quality of contents in its effort to introduce horticultural appreciation and the garden spirit to the people of America. A success in its mission, it was not so commercially. Why? Because in our complex modern life, writing is a commodity and has to be put on the market and sold like other commodities; in other words, it needs a publisher. It does not suffice to simply issue a sheet from the press.

The periodical is our best measure, then, of the conditions of the moment. It is made up of all kinds of writings which may also be analyzed and grouped in the manner already suggested. To be successful it must primarily satisfy a sufficiently large number of readers to make it a vehicle of communication between those who produce and those who consume. There are two factors which go hand in hand in making the modern periodical — the editorial or text matter on the one side, and the advertising or trading matter on the other side, and this inter-relationship is particularly marked in what are known as class, or trade, journals. Trade journalism in garden matters has reached its highest development in America, and commands the services of a large number of writers and workers; but the trade journal, the better it serves

its special purpose as a trade organ, the less it becomes adapted to the needs of those who are outside the commercial field and who garden for pleasure. The editorial point of view is restricted. Money making is the object of the tradesman; but money spending for the delight of acquiring what it can purchase is far more important to the enthusiast — to whom the term amateur is so unfortunately applied. The greater public influence in spreading the desire for gardening lies outside the field of the trade publications.

Publications of both kinds are essential. The trade cannot exist without the amateur enthusiast to consume the products; the amateur cannot indulge his hobby without the trade to supply his needs. Therefore, I submit that the trade and the professional man should look with a more kindly eye on the so-called "amateur" organ. The so-called ideal publication, encompassing all phases of the craft, trade and amateur together, can probably never exist. The ideal is false. The true ideal should be to cater neither to the trade nor to the amateur, but instead, to deal with gardening and horticulture in their broadest significance, instructing, entertaining, and attracting all interests as individuals, not as organized groups. This, at all events, is the ideal that I have set before myself.

A comparison of the contents of the earlier and present day periodicals is illuminating, though it practically parallels what has already been discovered in regard to garden books. I have heard it held as an indictment against the contents of the periodicals today that the garden writings now being offered in their columns are, on the one hand, too amateurish, catering too much to the uninformed; and at other times, that they are too technical and erudite, catering too much to the technician.

It all depends on the individual point of view. It is not easy to satisfy everybody, simultaneously and continuously. The periodical is designed to reach the greatest number of people of *all* interests. It is a teacher, an educator, a reporter, an idealist, all these at one and the same time. The relationship of an editor to the public is many sided; his constant occupation is finding out what the public wants and then finding the writers who can supply it. He is also the buffer absorbing the shocks from both sides. In reality, in the last analysis, it is the public itself that edits the periodicals it reads.

A tremendous transformation has overtaken the character of garden writings in periodicals during the last twenty years, but more especially within the last decade. We have seen the birth and growth of a certain group described popularly as the "country life" class. The individuals to whom this group caters have been imbued with that now almost universal desire of the American people to ally themselves with everything that has to do with the greater outdoors, spreading out from the cities and living more and more in the country and *on* the land, not *off* the land. These periodicals, indeed, are but an expression of that movement, which again illustrates that the people are the final editors. Country living has called for better homes, better houses, better grounds, better gardens, and this has called for a new kind of garden writing, which has largely been met. In catering to, and stimulating this sense of appreciation of the beautiful, the periodicals have assumed a sumptuousness of presentation and appeal and an appropriate correlation of methods and ideals.

The periodical writer is not only the reflector of present day conditions but he is also one of the most potent influences in shaping coming events, and in our gardening papers of wide circulation today, we discern the all consuming eagerness of the people for gardens of greater intrinsic interest and greater variety. We want more writers of ability acquainted with plant materials and their possible uses, forward looking, who can discern the needs of the American home and suggest appropriate methods of meeting them. They must have knowledge and imagination combined. Where are we to find such?

The nurseryman, wrapped up in the methods and intrinsic interests of his products, seeing them at very close range, usually lacks appreciation of the needs of the uninitiated.

The suburban amateur, on the other hand, can hardly formulate his needs; he is groping in the dark and crying for light, which the professional should be able to give.

The trained investigator and teacher is usually too much concerned with the data and laboratory methods to be able to tell convincingly and entertainingly the very things he wishes to impart; he cannot see the woods on account of the trees.

The commercial florist has a viewpoint too narrow and different from those who are developing the great outdoors.

The private gardener *should* be the best fitted to teach the larger public, for he is in a position to appreciate most thoroughly the needs and the longings of those with whom he is associated.

The skilled amateur has gone through the mill of his own experiences, and the true hobbyist is well fitted to teach and lead those who are coming behind.

The graduate of training schools and botanic gardens is entering professional and commercial channels, thus getting practical experience on a sound basis and can provide much that is required.

The handicap of all these — of everyone, indeed — lies in seeing his own sphere of interest in too great a proportion.

Garden writing for America is too great a subject, with too many sides and faces, to be treated from any one standpoint, by any one individual. Yet I am satisfied that the needs of the case are being met, and that the future garden writings of America will be interpretive and inspiring on a scale that the immensity of the subject demands.

The periodicals themselves exhibit the changes from the old orders and the beginning of the new. Formerly, they were the personal expressions of one individual; the editor was rather a preacher advocating his special cause or point of view, and indeed did most of the important writing. His publication was a personal expression, subject to all the dangers of narrowness.

Today, the editor writes little, practically nothing of value, but he offers opportunity for the expression of all phases of thought and differing viewpoints of all interests. What is wanted, indeed, are writers to use the opportunities.

METHODS USED IN THE PROPAGATION OF PLANTS.

By Theophilus D. Hatfield, Wellesley, Mass.

Delivered before the Society, March 4, 1916.

The profession of gardening is very much like the profession of medicine and the gardener may safely call himself a plant doctor. He brings plants into the world, takes care of them in sickness and in health, but, like the Chinese doctor, he is paid for his services only on condition that he keeps his patients well.

With gardening operations in general and particularly in the propagation of plants there is much that is experimental. The old saying is as true as ever "It is easy when you know how." Intuition, no doubt, plays an important part, practice makes perfect, we often guess and guess right, and if we don't succeed we try again.

When a young man it was my duty to wait on the propagator; help to make cuttings; tie after budding; clay after grafting; and otherwise fetch and carry. I often wondered how the propagator had accumulated so much knowledge and figured on the time it would take me to know so much. As I grew older and began to study the plants under my care, to get interested in wild plants and nature in the woods and pastures, I found many questions answered and I have found that nearly all the methods used by man in the propagation of plants exemplified by nature herself. As Shakspere observes

> "'Tis an art that doth mend nature,
> Change it rather, for the art itself
> is nature."

The propagation of plants may be divided into the following classes: from cuttings; by layers; by grafts; by division; and from seeds and spores.

Cuttings.

The first thing necessary is a propagating bed and the means to care for freshly rooted plants; just as an incubator is needed to hatch eggs and the conveniences for caring for the chicks when hatched. If one has a greenhouse it is easily done. Close a part of a bench with glazed sash or with cotton cloth as many florists do. Bottom heat will be needed which can be obtained by closing in the hot water pipes under the bench. About five inches of good clean gray sand, as a propagating medium, is necessary and head room above the cuttings. There should be a few degrees more heat in the bed than in the air; 75° to 78° is about right. If there is too much bottom heat vents must be provided to allow the surplus heat to escape.

If one does not have a greenhouse, a box with a pane of glass can be used and set over another box with a lamp underneath, incubator fashion, this with the means of controlling the temperature will furnish quite a serviceable bed.

The propagating bed will be mainly for soft wood cuttings taken into the greenhouse during the winter and spring for winter and spring grafting, and for the sowing of some seeds.

The idea of closing in the bed overhead is to control the air and sunlight, as fresh cuttings and grafts lose much by respiration in the daytime. The bed may be aired at night when there is less respiration, which helps also to harden the cuttings as they become rooted; a very important factor.

If the cutting has opposite leaves cut it off at a joint and it will root there or thereabouts. If the cutting has alternate leaves like the Heliotrope cut it anywhere, and it will root anywhere along the stem. Some leaves should be taken off to reduce respiration. What there is to know is what is the proper condition of the wood and the conditions under which cuttings will root. This can be learned only by experience. It is a hard thing to explain as no two gardeners have the same conditions, nor is their experience just the same.

It will be safe to make the sand quite firm, the cuttings quite firm in the bed, and in giving them plenty of water and shade from

sunlight for the first few days. As they root less water and less shade will be required. The best time to root soft wood cuttings is in the spring as the conditions can be more easily controlled.

In this way can be rooted all greenhouse stock such as Heliotrope, Carnations, Stevia, Salvia, soft wood cuttings of Roses, Lantanas, Fuchsias, Abutilon, Geraniums, leaf cuttings of Begonias, growing cuttings of Azaleas, Heaths, Acacias, Cytisus, and some varieties of Antirrhinums and Ageratums.

At this time Lilacs, Deutzias, Spiraeas, Philadelphus, and other spring-flowering shrubs, when forced under glass, afford means of propagating these plants from soft cuttings. This fact is often taken advantage of by nurserymen with rare shrubs, *Daphne cneorum*, for one, to force the plants under glass for cuttings, and root them in the spring. It is often the best way.

In general practice, however, many tree and shrub cuttings are rooted from half-ripened wood taken from outdoors during the summer. For these the propagating bed may be used without bottom heat, though it is sometimes done in a cool greenhouse in flats, and may be done in a cold frame.

This is a good way to root, in addition to those previously mentioned, Evergreen Azaleas, Viburnums, Cotoneasters, Forsythias, Ligustrums, Catalpas, Lonicera, Symphoricarpos, and some Roses taken with a heel. All spring-rooted cuttings should be potted at once. Shrub and tree cuttings, rooted after midsummer, are often left where rooted until spring.

With many of the trees and shrubs there is another chance, and that is by hard wood cuttings taken after the leaves fall. The nursery practice is, for such as Lilacs, Deutzias, Spiraeas, and many others given in the previous lists, to make cuttings in the autumn, tie them in bundles, and store them in moist soil or sand until spring. During the winter they will form a callus or root-bearing surface. They should be planted out in spring and a fair percentage of them will root during the summer.

Many trees and shrubs may be propagated from root cuttings, more than is generally supposed. The practice is to cut up roots and store them in flats of sandy soil over the winter. This may be done with the Quince, Ailanthus, Cladrastis, Eleagnus, Fothergilla, Elms, Prunus, Wistarias, and some Roses (*R. lucida, R.*

rugosa, R. cinnamomea, and *R. alpina*). Some of these root cuttings, especially the trees, will take two years to make plants. This is a common practice with the Japanese Anemone and some greenhouse plants such as Dieffenbachia, Dracaena, and Bouvardia.

Cuttings of evergreen trees and shrubs, mostly coniferous plants, are put in during the autumn and kept over in a cool greenhouse or cold frame. The same thing is done with Cotoneasters, Euonymus, and Buxus. They scarcely do more than callous during the winter. A fair percentage may be expected to root during the following spring and summer, but some Junipers, Torreyas, and Taxus may lay over another year. Those that root may be planted in the spring, but it is customary to keep them in flats until established as the roots of some are very brittle, especially the Yews and Torreyas.

It is best to root all the forms and variations from the type from cuttings, especially the foliage forms of conifers, as they are surer of retaining their varietal character than when grafted. Ordinarily the juvenile forms of Thuya, Juniper, and Chamaecyparis, with acicular whorled leaves, give way in a few years to the adpressed adult form and sometimes quite extreme forms. If, however, these juvenile and other forms are rooted from cuttings they will very likely retain their individuality during the lifetime of the plant. In this way many peculiar forms of conifers have been established and are now in cultivation, but if grafted they are liable to take on the adult form or revert sometime or other, either wholly or in part. The dimorphic character of many conifers makes it difficult to fix these variations with any degree of certainty and they sometimes break away. The Red Cedar, as before stated, has at first acicular juvenile leaves and later adpressed, scale-like adult leaves. Now if it is pruned or gets injured the first new leaves that appear are juvenile and it does not resume the adult form for two or three years, starting life over again, after a setback, so to speak.

It takes less time to flower a plant from a cutting or graft than from a seed and at less stature. This fact is often taken advantage of to dwarf stock. A cutting of the well-known Poinsettia if taken in spring and grown will sometimes reach a height of six feet before flowering, but if a cutting is taken in July it will flower at one-third

this height or less. It is a common practice to take cuttings of flower stems of *Crassula coccinea* and bloom them when a few inches high, and the same can be done with *Sedum spectabile*. The ordinary garden Phlox can be rooted from cuttings and grown as a pot plant and has considerable decorative value. Chrysanthemums can be bloomed down to a foot high, depending on when the cuttings are rooted.

Drop a leaf of a Rex Begonia on the sand of the propagating bed and it will root at almost every leaf fork. This suggestion has been taken advantage of by growers of the famous Begonia Gloire de Lorraine and now stock of this is raised almost exclusively in this way.

By leaf cuttings is often the only way to fix a sport. Sports as they occur in Chrysanthemums and Carnations mean a change in the color of the flower, sometimes half and half. Generally the sporting does not extend to the whole shoot and shoots below a certain point produce normal flowers, so to fix a sport it must be done from the shoot that produces it. Sometimes one is limited to leaf eyes which generally root quite easily and so the sport is fixed. The plants obtained will produce rootstocks the following autumn from which can be got a plentiful supply of cuttings. Rose sports can be treated in the same way, although grafting and budding may be practised with these.

In fixing Carnation sports it is necessary to go through much the same experience. A cutting or two may be obtained from the shoot that produces the sport, but in order to obtain a greater increase resort must be had to leaf eyes. As, however, all sports are bud variations still other sports are liable which has been known to happen.

Propagation of any particular plant means the perpetuation of that plant in another individual. Every new plant raised in this way is a part of the original and just as old; it is the same plant. In connection with this fact it is not unusual when a Carnation gets ready to sport it sports in several places at the same time. So well known is this fact by judges that whenever a sport is put before them for certification the award, if considered, is generally witheld until it is found if the sport has appeared elsewhere.

Layering.

Layering is very much nature's way. She does it quite openly. To get a plant on its own roots is a very good way and in some cases, if not the only way, it is the best and most practical way. Rhododendrons cannot very well be rooted from cuttings. I do not say it is impossible, for what one cannot do another may, but for most people it is impracticable to root Rhododendrons from cuttings. They can be layered though it may take two years to do it. Layering for Rhododendrons is in my opinion best for this country and in the opinion of one noted grower best for any country.

In foreign countries the most easily workable stock for grafting Rhododendrons is Ponticum, a plant of uncertain hardiness in itself here. It is well enough to use it for a stock if grafted low enough so that the cion gets on its own roots, but uncertain and short-lived as a stock. The result is when we import Rhododendrons unless we get layered plants we get something not dependable.

As a rule plants that will not layer are difficult to root from cuttings. I have never seen Pines, Hemlocks, or Firs layer naturally, or even artificially, nor have I been able to root them from cuttings. As I said before nature often shows the way and we frequently find Hydrangeas, Loniceras, Deutzias, Forsythias, Viburnums, Currants, Gooseberries, and Grape vines rooting wherever they happen to strike the ground. With this hint man goes nature one better by making cuts in the stem, bending the branch to the soil and covering it with prepared loam.

Formerly Carnations were rooted mostly by layering. We had not become acquainted with the expeditious methods now in use in this country where they are rooted by tens of thousands from cuttings.

Grafting.

Grafting has been said by one notable authority to be a makeshift at best. I will not venture to disagree with that authority. It is a valuable makeshift nevertheless. In this, as in all other methods of propagation, nature has shown the way and examples of natural

grafting, while not common, are still common enough to have come within the observation of most gardeners and others interested in horticulture. With few exceptions plants would prefer to be on their own roots and they make strenuous efforts to get there if given a chance.

Nevertheless, grafting is indispensable and few processes have added more to the material welfare of mankind. We would be in a poor way for Apples, Plums, Peaches, Pears, and Apricots, not forgetting Lemons and Oranges, if we had to depend on other methods.

There are various methods of grafting and budding but both depend on one thing and that is the union of the cambium layers of stock and cion. The cambium layer lies between the bark and the wood. It is here all annual growth is made. It is the center of the plant's activities, the life center. A tree may be perfectly hollow and live so long as the cambium is uninjured.

There is one essential that must never be lost sight of and that is the stock and cion must be in about the same state of activity, probably better if the stock is a little ahead of the cion. Even though they be dormant both should be evenly matched when working them.

For indoor grafting the roots of the stock must be active, even though the plant has otherwise made little growth. It is well, too, that the cions be brought in a little time before being worked so as to get some life into them.

As to which method is adopted depends on the time of the year, the kind of plant, the condition of the stock and cion, and the object in view. Whatever is done it will take time and experience to succeed. Indoor grafts, excepting conifers, may be waxed over, tied up in bundles, and packed away in sphagnum moss until united. Outdoor grafting should be done in springtime well near the ground level and earthed up. There will be no need to wax them over. Dormant stock grafted indoors in winter may be stored in moist soil or sand until the time comes for planting them out.

Generally one must graft like on like, though there are exceptions, for we are not limited to the same species or even genus. Some plants are increased in vigor by the use of a stronger-growing species or variety for a stock, and the reverse may happen.

No better illustration of the effect of stock on cion could be given than the Rose. Most Roses could be easily got on their own roots by cuttings or layers. Tea and Hybrid Tea Roses grafted or budded on the Manetti attain more vigor than when on their own roots and this is the universal practice now. Roses grafted or budded on the English Briar, which has a distinct period of winter rest, do not force as well as when on the Manetti, which grows more or less all the time. On the contrary Roses on the Briar are better for outdoor planting.

The Paradise Apple stock is used for dwarfing Apples. For dwarfing Pears a different genus, Cydonia, is used. Although the Apple and Pear belong to the same genus they cannot be successfully grafted on each other.

The Hawthorn evidently has an unusual affinity with several members of the pomifera or Apple group. Pears, Cotoneasters, and Mespilus can be grafted on it, all different genera. From a shoot near the union between the Hawthorn and the Mespilus has arisen what is known as a graft hybrid, named Crataego-Mespilus, intermediate in character between both parents. Cytisus can be grafted on Caragana, Lilacs on Privet, and there are other anomalous cases. Plums may be grafted on Peaches and Peaches on Plums. For light soils and in the South Peach stock is preferred. For heavier soils and in the North Plum stock is preferred. European Peaches and Plums may be grafted on the native *Prunus americana* stock.

The cions of dwarf stocks should be kept above ground. When planted there is a chance that the annual layers of growth may overlap and eventually reaching the ground and rooting may put the plant on its own roots and the dwarfing lost. This happened on an estate not far from Boston where the fillers, dwarfs or supposed to be, got on their own roots and their value as such lost. Attaining normal size they crowded the permanent trees and had to be cut out prematurely.

Grape vines are nearly always raised from cuttings or layers. The youngest plant being a part of the parent is just as old. It has been on its own roots all the time. Varieties on their own roots show no constitutional variation. The Black Hamburg Grape is the same the world over, now as ever.

It is not so with grafted plants. There are variations even in the Baldwin Apple. Go to our fruit shows and it will be hard to find two dishes of Baldwin Apples that look alike. The fact is the Baldwin Apple has sported and to standardize that or any particular sport it will have to be fixed and the best way to do that is to get it on its own roots. Propagators will use the best form or variety for grafting and still get sports. No reliance can be placed on any as long as mixed seedling Apple stocks are used. Something has been done by root grafting to get Apples on their own roots. It does not appear, however, that this was what the operators had in view, but rather economy in operation. It is a cheap and easy way, but there is a very good chance that cions will get on their own roots when root grafted.

Division.

The division method of propagation should be easily comprehended. It is applied mostly to herbaceous or hardy border plants and some greenhouse plants. It is best done when the plants are at rest. It is also the general practice with Ferns, excepting some Tree Ferns, in which case one must depend on spores which will be described further on.

Seeds.

One does not have to look far for evidence of the seed method in the propagation of plants. It is to be seen everywhere. To reproduce itself is the last expiring effort of all plant life when it comes to this. The annual does it in one year, the biennial in two. When an old Black Spruce or Pitch Pine is seen loaded with cones it is getting ready to die. I have known Peach trees make an unusual floral display, set a big crop of fruit, and die before bringing it to maturity. It is often stated that Peach trees are short-lived. The probability is that they had been allowed to carry too much fruit.

When a cutting, layer, or graft is started the parent is reproduced but when a seed is started a new individual is created. Seedlings

have an individualism not possessed by cuttings or layers. A counterpart of the parent may be reproduced or something new is liable to happen. In the one way it is known what to expect, in the other it is uncertain, and therein lies the fascination of growing plants from seed. A man with a thousand Carnation seedlings about to bloom is on tiptoe all the time.

Some of the variations of seedlings in color or form can by selection and improvement be fixed so that they can be relied upon and will come true from seed. These are called strains. Among the strains of flower seeds that come true to color are Cosmos, Antirrhinums, China Asters, Balsams, Canterbury Bells, Cyclamen, Primulas, Gloxinias, Dianthus, Hollyhocks, Petunias, *Phlox Drummondi*, Poppies, Salvia, Stocks, Sweet Peas, and many others.

It is not expected, however, that forms or foliage variations can be fixed in seeds. They generally revert to the type, but there are cases where forms have become fixed from seed. For example, *Tsuga macrophylla*, a form of *Tsuga canadensis*, holds its form in seed. So do Wiers Cut-leaved Maple, Purple Beach, Golden Spiraea, the purple leaved Japanese Maple, and the purple leaved Barberry. A fair percentage of all these come true. The probability is that all these were seed variations in the first place rather than sports.

The subject of the acclimatization of plants from seed is an interesting one. It is going on all the time by natural as well as artificial means. What nature has taken ages to do man may do in a lifetime. The Japanese Clematis was tender when first introduced, but after a generation of seedlings it proved perfectly hardy. The Irish Yew, an imported plant, is not hardy here, but its seedlings are perfectly hardy. They have been left out without any protection since six inches high.

For seeds sown in springtime underglass, having a short period of germination it is customary to use seed boxes (12 + 16 + 2). They are easy to handle and to take care of in the matter of water and besides do not permit an over abundance of material. Good light loam is best for most seeds. It should be made firm and marked out for seeds big enough to see easily. It is hardly necessary to cover the seeds, merely give the box a shake. Very fine seeds such as Begonia, Gloxinia, and Streptocarpus should be sown

broadcast, first covering the soil with a sprinkling of sphagnum moss. This makes an excellent germinating medium and should be tried wherever there is difficulty in germination.

We divide our seeds into batches, one for indoors and one for outdoors. The indoor batch includes all greenhouse plants such as Grevillias, Dracaenas, Gloxinias, Begonias, and Primulas. We also sow some tender annuals indoors such as Asters, Salvias, Penstemons, Ageratums, Lobelias, Zinnias, and border Antirrhinums, and such as we want early, and all fine seeds of hardy annuals that would be lost if sown in the open.

Hardy annuals and some perennials are sown outdoors in late April or May such as Agrostemma, Alyssum, Candytuft, *Gypsophila elegans*, Larkspurs, Four o'clocks, Calliopsis, Indian Pinks, Lupines, Sweet Sultans, Mignonette, Marigolds, *Phlox Drummondi*, Poppies, Sunflowers, and Sweet Peas. Biennials and some plants wanted for spring bedding such as Pansies, Violas, Myosotis, Foxgloves, Canterbury Bells, and Sweet Williams are sown about midsummer. Also autumn blooming greenhouse plants such as Calceolarias, Schizanthus, and Cinerarias.

There is more trouble with seeds sown indoors than out. Abundance of light and air as the seedlings come up will do much to ward off the various fungoid diseases that attack young plants. The same soil and conditions with regard to ventilation and shade will not do for all. Generally as seeds germinate they are to be shifted to cooler quarters to harden them off. The seedlings must be pricked off as soon as large enough to handle. With outdoor seeds all that is necessary is to see that they have plenty of water.

We frequently find seedlings of berried and fruit-bearing plants growing where the seeds have been dropped by birds. It is, therefore, quite natural to consider fruit to be eaten first in the natural distribution of plants by birds. So if berried seeds are to be sown as soon as ripe it will be better to wash them out in order to simulate this natural process, though sometimes when seeds are stratified, a process described further on, the natural process of decay does practically the same thing.

We are accustomed to expect seeds to germinate in a month or two. The majority do but many tree and shrub seeds do not and some must go through a period of freezing to have them germinate.

This is the case with most hard-coated seeds. If one does not know how long it takes seeds to germinate it is well to hold over the seed boxes for at least one year. Many seeds lose their vitality if kept dry for any length of time. If it does not matter when seeds germinate so long as they do so it is just as well to sow them as soon as ripe. It may explain some previous failures and it sometimes happens that a year's time is gained.

The Japanese Barberry, if held over and the seeds get dry, they are likely or the greater part of them, to lay over still another year, and the same with Rose seeds; but if sown in the open with merely a cover of litter added to keep them from being thrown on the surface by frost, otherwise called "heaving," about all of them will be up in spring. This is where freezing helps.

When it is known how long it takes for seeds to germinate the time can be regulated. Some tree and shrub seeds germinate within a few weeks, sometimes in a few days, after sowing and these seeds can be held from autumn until spring. Most Pines, Spruces, Firs, Thuyas, and Chamaecyparis may be sown in spring and come up soon afterwards. Elms ripen early in the spring and come up in early summer. Some shrub seeds such as Deutzias, Spiraeas, Lilacs, Buddleias, and Philadelphus also come up quickly. *Buddleia variabilis,* known as the Summer Lilac, sown indoors last March, grew six feet before September, with flower stems four feet long. This achievement certainly puts this handsome Chinese sub-shrub in an impressive light.

As a rule berried and nut seeds lay over a year. Some of them as soon as ripe, and some as in the case of *Cotoneaster Dielsiana* and *Magnolia stellata,* may come up the following spring, or only a part of them may germinate; or they can be stratified until spring, one or two years as need be, which means that the seeds may be laid away in moist earth or sand and sown when it is expected they will germinate. This is done by nurserymen and others who value space.

I prefer to sow seeds that lay over as soon as ripe. Some will come up the first year and first year seedlings are usually the strongest and are worth taking note of by the plant breeder. Gardeners generally are agreed that the first seedlings of florists' flowers are usually the strongest and also the poorest in floral quality and

they always are very careful to save the later and weaker ones. If they are looking for double flowers or fine colors they are surer of getting them among these. Among Rhododendrons the first in a batch to bloom are always the strongest growers and the poorest in flower.

The list of berried and nut seeds that may be sown in the autumn or stratified is a large one. I give only a few: of tree seeds, Oaks, Chestnuts, Walnuts, Beech, some Pines, Yews, Ginkgo, Aesculus, Acer, Fraxinus, Crataegus, some Pyruses, some Prunuses, Liriodendron, Sassafras, and Junipers. Yews, Junipers, and Crataegus sometimes lay over three years; of shrub seeds, some Prunuses, some Pyruses, Cydonia, Lonicera, Rhamnus, some Styrax, Dirca, Ilex, Ligustrums, Cotoneasters, Fothergilla, Halesia, Hamamelis, Symphoricarpos, and some Roses if the seeds have become dry.

The seed method is applied to Palms and it is the only practical way to propagate them. It is a special industry and very few gardeners raise the Palms they use.

I found Rhododendrons growing wild in mossy places on the Hunnewell Estate at Wellesley and that was a clue to conditions under which I could expect to succeed in germinating them. I naturally thought to simulate these conditions in a cool greenhouse, using moss as a germinating medium. They did not do so well in a cool greenhouse and I later found a warm house better for the germinating period. I now raise and transplant Rhododendrons, Azaleas, Heather, Cornish Heaths, Corsican Heaths, Irish Heaths, and their allies in the same house with seedling Orchids.

I use seed boxes, 12 + 16 + 2, and fill them nearly full with coarsely sifted peat with a little sand mixed in. It is then pressed firmly and about one-sixteenth of an inch of sphagnum moss is sifted on. The boxes are then wet and the seeds scattered without covering.

I have lately extended this plan of seed sowing to all fine seed with excellent results. All gardeners know what "mifty" things Calceolarias are to handle, but sown on sphagnum moss they give no trouble.

The soil is kept quite moist until the seedlings are up, four to six weeks, and then fairly moist. When large enough to handle

they are moved into boxes of the same material and set about one inch apart and kept in the same house until July. After that they go into a cooler house and are well aired and slightly shaded until the middle of September. Then they are exposed to harden until frosty weather and after that housed in frost-proof quarters for the winter, although a little frost would do them no harm.

Gardeners are often asked a question like this, "I have a Begonia. How often shall I water it?" Frankly, that question without the plant at hand is impossible to answer. I usually say "When the plant is dry" which to the inquirer is no answer at all. To most people it would mean when the plant is dust dry and sometimes that would be all right for a Geranium, a Tuberous Rooted Begonia, or a Gloxinia going to rest.

To know when seed boxes want water is just as hard to tell. There is a good deal of intuition in this as in much other garden work. It is not always necessary to look at the surface of the soil; it is one indication, but may be a false one. If one has cared for a lot of seed boxes from the beginning and knows the condition it might be said consistency of the soil, the kind of atmosphere, bright or shaded, will indicate to him how often seeds want water, independent of surface conditions. Sometimes a finger pressed into the soil or the weight of the box will indicate that.

Small seeds, as has been shown, are barely covered and sometimes not at all. In such cases the surface must be kept moist. To let it dry for a day or bright sunshine strike it for an hour would be fatal for the seedlings.

Spores.

The spore method belongs to Ferns. Their reproductive method is entirely different from that of flowering plants. Spores are found generally on the back of the leaves, sometimes on special leaves or fronds as they are called. Falling on the ground or any suitably moist place they form a kidney-shaped patch of green like a small leaf from which is developed a new plant.

TAMING THE WILD BLUEBERRY.[1]

By Frederick V. Coville, Washington, D. C.

Delivered before the Society, with stereopticon illustrations, March 11, 1916.

[The substance of this lecture is contained in Bulletin No. 334, United States Department of Agriculture, entitled Directions for Blueberry Culture, 1916. By Frederick V. Coville, Botanist. It is here reprinted by permission with change of paging and omission of plates.]

Special Requirements.

Success in blueberry culture rests especially on the recognition of two peculiarities in the nutrition of these plants: (1) Their requirement of an acid soil; (2) their possession of a root fungus that appears to have the beneficial function of supplying them with nitrogen.[2]

If blueberries are planted in a soil with an alkaline or neutral reaction, such as the ordinary rich garden or fertile field, it is useless to expect their successful growth. In such a situation they become feeble and finally die. Blueberries require an acid soil, and they thrive best in that particular type of acid soil which consists of a mixture of sand and peat.

Good aeration of the soil is another essential. It is commonly but erroneously supposed that the swamp blueberry (*Vaccinium corymbosum*), the species chiefly desirable for cultivation, grows best in a permanently wet soil. It is to be observed, however, that the wild plants of the swamps occupy situations which, though

[1] Revised by the author from the original paper of 1913, entitled "Directions for Blueberry Culture," which was published, without illustrations, as pages 3 to 11 of Circular 122, Bureau of Plant Industry, and was also separately printed.

[2] For a full discussion of the principles of blueberry culture, including the soil requirements and peculiarities of nutrition of the blueberry plant and the details of the growing of seedlings, consult "Experiments in Blueberry Culture," Bulletin 193, Bureau of Plant Industry, 1910, or the corrected reprint of 1911. Although the edition of this bulletin was long since exhausted at the Department of Agriculture, copies may be obtained from the Superintendent of Documents, Government Printing Office, for 25 cents each.

perhaps submerged in winter and spring, are exposed to the air during the root-forming period of summer and autumn or, when growing in permanently submerged places, they build up a hummock or a cushion of moss which rises above the summer water level and within which the feeding roots of the bush are closely interlaced. In actual culture, moreover, it has been found that the swamp blueberry does not thrive in a permanently wet or soggy soil.

Although some species of Vaccinium, such as the common low-bush blueberry of the northeastern United States, *V. angustifolium* (called *V. pennsylvanicum* by some authors), grow and fruit abundantly in sandy uplands that are subject to drought, the swamp blueberry grows best in soils naturally or artificially supplied with adequate moisture.

These, then, are the three fundamental requirements of successful blueberry culture: (1) An acid soil, especially one composed of peat and sand; (2) good drainage and thorough aeration of the surface soil; and (3) permanent but moderate soil moisture. Under such conditions the beneficial root fungus which is believed to be essential to the nutrition of the plant need give the cultivator no concern, for even if the necessary fungus were wholly lacking in the soil of the new plantation each healthy bush set out in it would bring its own supply of soil-inoculation material.

Next in importance to soil conditions is a convenient location with reference to a good market. The berries should reach their destination without delay, preferably early in the morning following the day of picking. To secure the best prices they should also reach the market about the beginning of the main wild-blueberry season. A situation to the south of the great areas of wild blueberries in northern New England, Canada, and northern Michigan is therefore desirable. One of the most promising districts for blueberry culture is the cranberry region of New Jersey, for there an ideal soil occurs in conjunction with an early maturing season and excellent shipping facilities to the markets of Philadelphia, New York, and Boston.

Situations liable to late spring freezes, such as the bottoms of valleys, should be avoided, for while the blueberry plant itself is seldom injured by freezing, its crop of fruit is often destroyed in this way.

In seasons in which the wild crop of upland blueberries has been destroyed by late spring freezes, it has been observed that in or around bodies of water, such as cranberry reservoirs or cranberry bogs temporarily flooded to prevent frost or insect injury, the wild bushes often produce normal crops of blueberries. It may be found that provisions for flooding blueberry plantations will save a crop often enough to warrant the installation of flooding equipment. In locating a blueberry plantation, therefore, it would be well to choose a situation that could be flooded, if flooding proved later to be commercially advantageous.

Importance of Superior Varieties.

In the southern United States and in the Middle West blueberries are not ordinarily distinguished from huckleberries, but in New England the distinction is very clearly drawn. The name huckleberry is there restricted to plants of the genus Gaylussacia, the berries of which contain 10 large seeds with bony coverings like minute peach pits, which crackle between the teeth. The name blueberry is applied in New England to the various species of the genus Vaccinium, in which the seeds, though numerous, are so small that they are not noticeable when the berries are eaten. It is probable that the comparatively low estimation in which this fruit is held in the South is largely due to the lack of a distinctive popular name and the consequent confusion of the delicious small-seeded southern Vacciniums with the coarse large-seeded Gaylussacias. It is the culture of the small-seeded blueberries only, as distinguished from the large-seeded huckleberries, that is here advocated.

From the market standpoint, the features of superiority in a blueberry are sweetness and excellence of flavor; large size; light-blue color, due to the presence of a dense bloom over the dark-purple or almost black skin; "dryness," or freedom from superficial moisture, especially the fermenting juice of broken berries; and plumpness, that is, freedom from the withered or wrinkled appearance that the berries begin to acquire several days after picking. Large berries cost less to pick than small ones and bring a higher price. A berry

eleven-sixteenths of an inch in diameter has already been produced under field culture, and others of still larger size are to be expected.

Although blueberry plantations may be formed by the transplanting of unselected wild bushes or by the growing of chance seedlings, neither of these courses is advocated, because neither would result in the production of fruit of an especially superior quality. Seedling plants, even from the largest berried wild parents, produce small berries as often as large ones. Until nurserymen are prepared to furnish plants asexually propagated from superior stocks, the cultivator should begin by the transplanting of the best wild bushes, selected when in fruit for the size, color, flavor, and earliness of the berry and the vigor and productiveness of the bush. These he should propagate by layering and by cuttings until his plantation is completed. Through a combination of these methods, a valuable old plant can be multiplied by several hundred at one propagation, the fruit of the progeny retaining all the characteristics of the parent.

Propagation.

While grafting and especially budding are useful in experimental work, neither method is suitable for commercial plantations, because blueberry bushes are continually sending up new and undesirable shoots from the stock. The best season for budding for experimental purposes is from the middle of July to the end of August. The ordinary method of shield budding, with dry and unwaxed raffia wrapping, has proved the most successful of all the methods tried. The best wood on which to bud is the lower portion of vigorous basal shoots of the season, especially those from plants that were cut to the stump in the preceding winter. On such shoots the bark can be lifted with ease much later in the season than on older stems. Special care must be taken that the raffia wrapping does not become wet and fermentation ensue between the raw surfaces of bud and stock, in the first three weeks. By that time, in normal cases, the bud wood has united with the stock, and if the budded stem has increased in diameter sufficiently to cause pronounced choking by the raffia the wrapping should be removed. If choking does not occur the wrapping may be allowed to remain until spring, when the stem

is cut off above the still dormant bud. In greenhouse experiments, a growth of over 8 feet has been secured from an inserted bud in its first growing season, all other growth from the stock having been promptly rubbed off as soon as it started.

Stumping.

The easiest way to propagate the swamp blueberry is by a special process of layering named "stumping." The directions are as follows:

1. In late fall, winter, or spring, preferably in early spring before the buds have begun to push, cut off at the surface of the ground either the whole of the plant or as many of the stems as it is desired to devote to this method of propagation. The stems that are cut off are discarded, or they may be used for cuttings, as described under "Tubering" or "Winter cuttings."
2. Cover the stumps to the depth of 2 to 3 inches with a mixture of clean sand and sifted peat, 2 to 4 parts of sand to 1 of peat, by bulk. A rough box or frame may be built on the ground to keep the sand bed in place.
3. Care must be taken that the sand bed be not allowed to become dry except at the surface during the summer.
4. The new growth from the stumps, which without the sand would consist of stems merely, is transformed in working its way through the sand bed into scaly, erect, or nearly erect rootstocks which, on reaching the surface of the sand, continue their development into leafy shoots. Although roots are formed only sparingly on the covered bases of stems, they develop abundantly during spring and early summer on these artificially produced rootstocks, and by the end of autumn all the shoots should be well rooted at the base. They should remain in place in the sand bed till late winter or early spring, undisturbed and exposed to outdoor freezing temperatures; but the sand should be mulched with leaves, preferably those of red oaks.
5. Early in the following spring, before the buds have begun to push, open the bed and sever each rooted shoot carefully from the stump. Discard the upper portion of the shoot, making the cut at such a point as to leave on the basal portion about three buds above the former level of the sand bed. If the cut at the basal end of the rooted shoot is not smooth or the wood is cracked, recut the surface with a sharp thin-bladed knife. The discarded upper portion of the shoot may be used for winter cuttings, as described on pages 112 to 115.
6. Set the rooted shoots in a coldframe or a cool greenhouse in clean

earthenware pots of suitable size, ordinarily 3-inch pots, in a soil mixture consisting of two parts, by bulk, of rotted upland peat and one part of sand.

7. Cover the frame with muslin or other white shade suspended above the glass, giving the plants plenty of light but no direct sunlight, and for the first two or three months keep the temperature at not to exceed 65° F. if practicable. When subjected to high temperatures the newly cut shoots are liable to die and rot from the base upward. The outer surface of the pots should never be allowed to become dry. The desired condition may be assured by bedding, or "plunging," the pots in moist sand up to the rim.

8. Watering should be as infrequent as practicable, only sufficient to keep the soil moist but well aerated.

9. The frame should receive ventilation, but not enough to cause the new twigs to droop. These are most susceptible to overventilation and to overheating when they have nearly completed their growth.

10. After the new twigs have stopped growing and their wood becomes hard new root growth takes place. Then secondary root growth follows, either from the apex of the new twigs or from another bud lower down on the old wood of the original rooted shoot. Until this secondary twig growth takes place the life of the plant is not assured.

11. Those plants that make sufficient growth to require repotting during the first summer should be set in clean pots of 2 inches larger diameter in a standard blueberry-soil mixture.

Soil mixture for Blueberries.

A very successful potting mixture or nursery-bed mixture for blueberry plants consists of one part of clean or washed sand, nine parts of rotted upland peat, either chopped or rubbed through a sieve, and three parts of clean, broken crocks, that is, pieces of ordinary unglazed, porous, earthenware flower pots. No loam, and especially no lime, should be used. Manure is not necessary, and in the present state of our knowledge may be regarded as dangerous, although in small quantities it serves to stimulate the plants, at least temporarily. The danger from manure apparently lies in its tendency to injure the beneficial root fungus of the blueberry plant.

The use of broken crocks in the potting mixture is based on the fact that the rootlets seek them and form around them the same kind of mats that they form at the wall of the pot, thus increasing the effective root surface and the vigor of growth. If crocks are not available, the soil mixture should consist of 2 to 4 parts of peat to 1 part of sand.

The peat most successfully used for potting blueberry plants is an upland peat procured in kalmia, or laurel, thickets. In a sandy soil in which the leaves of these bushes and of the oak trees with which they usually grow have accumulated and rotted for many years, untouched by fire, a mass of rich leaf peat is formed, interlaced by the superficial rootlets of the oak and laurel into tough mats or turfs, commonly 2 to 4 inches in thickness. These turfs, ripped from the ground and rotted from two to six months in a moist but well-aerated stack, make an ideal blueberry peat. A good substitute is found in similar turfs formed in sandy oak woods having an underbrush of ericaceous plants other than laurel. The turfs of low-bush blueberries serve the same purpose admirably. Oak leaves raked, stacked, and rotted for about 18 months without lime or manure are also good. The leaves of some trees, such as maples, rot so rapidly that within a year they may have passed from the acid condition necessary for the formation of good peat to the alkaline stage of decomposition, which is fatal to blueberry plants. Even oak leaves rotted for several years become alkaline if they are protected from the addition of new leaves bearing fresh charges of acidity.[1] The much decomposed peat in the submerged lower layers of deep bogs, such as is used for fuel in Europe, is not suitable for blueberry-soil mixtures.

Tubering.

By ordinary methods, cuttings of the swamp blueberry have been rooted only in occasional instances. Successful special methods, however, have now been devised for these plants. Wild stocks of the swamp blueberry vary greatly in their response to propagation by a particular method, and it is likely to prove true that one variety of cultivated blueberry can best be propagated by one of the methods here described, others by another. The most novel of the methods devised, but the one easiest of operation, is that of tubering. This method involves the same principle as that em-

[1] For a fuller discussion of the conditions under which leaves decompose into leaf peat as distinguished from leaf mold, and the fundamentally different effect of the two on the growth of plants, consult "The Formation of Leafmold," Smithsonian Report for 1913, pp. 333 to 343 (also separately printed).

ployed in stumping, namely, the forcing of new shoots in such a manner that their basal portions are morphologically scaly root-stocks, with a strong rooting tendency. The directions for tubering as applied to the swamp blueberry are as follows:

1. Make stem cuttings from outdoor plants between midwinter and early spring, before the buds have begun to make their spring growth, and preferably on a warm day when the twigs are not frozen. A still better plan is to make the cuttings in autumn after the leaves have fallen, and store them for about two months in moist sphagnum moss on ice at a temperature just above freezing.

2. The cuttings are to be made from vigorous plants grown in well-lighted situations and with stems therefore well stored with starch. Use unbranched portions of the old and hardened branches and stems, about a quarter of an inch to an inch, or even more, in diameter. From 3 to 4 inches is a suitable and convenient length. Make the cuts with pruning shears or a fine-toothed saw and remove the bruised wood at the cut ends with a sharp knife. Be careful not to injure the bark or split or strain the wood.

3. Lay the cuttings horizontally in a shallow box or other cutting bed of pure clean sand and cover them to the depth of about half an inch. Moisten the sand well with rain water, bog water, or other pure water (free from lime) from a sprinkling pot, and see that the sand is closely and firmly packed about the cuttings. Cover the box or cutting bed with a pane or panes of glass, the top of the box being flat, so that the glass fits it rather snugly. The box should be so prepared that any surplus water in the sand will drain away beneath through holes in the bottom covered with clean broken crocks and sphagnum moss.

4. Keep the box at a temperature of 55° to 65° F., or as near those limits as practicable. A temperature of 70° or over is likely to ruin the cuttings.

5. In order to avoid excessive temperatures, do not allow direct sunlight upon the glass, either keeping the box by north light or keeping it shaded, as by a white cloth or paper cover suspended several inches above the glass, or in a shaded greenhouse.

6. Keep the air inside the box saturated with moisture. This condition will be evidenced by the condensation of the moisture on the under side of the glass during the cooler part of the day or whenever a cold wind blows against the glass.

7. Watering should be as infrequent as practicable, only sufficient to keep the sand moist but well aerated and the atmosphere in the box saturated. If the glass fits tightly, a second watering may not be needed for several weeks.

8. Within a few weeks new growth will begin to appear above the sand. When the shoots have reached a length proportionate to their vigor, com-

monly 1 to 3 inches, their further growth is self-terminated by the death of the tip. After the leaves have reached their full size and acquired the dark-green color of maturity the time has come for the development of roots.

9. When the first shoot has reached this rooting stage a half-inch layer of finely sifted rotted peat, 2 parts, and clean sand, 1 part, should be placed on the surface of the cutting bed and moistened well with water. A time-saving and perhaps desirable modification of this treatment is to use this mixture of peat and sand as the original covering of the cuttings, described in paragraph 3.

10. The new growth, which if it had originated above the sand would be like an ordinary shoot, was transformed in working its way through the sand and became a scaly, erect rootstock, which on reaching the surface of the sand continued its development into a leafy shoot. During the spring and early summer, roots form in abundance on the lower or rootstock portion of these shoots.

11. After a shoot is well rooted it commonly, though not invariably makes secondary twig growth the same season, usually from a bud in the axil of the uppermost leaf. If the rooting of the shoot has not already been ascertained by direct examination, the making of such secondary growth is good evidence that rooting has actually taken place.

12. When a shoot is well rooted, with roots 1 to 2 inches in length, it is ready to be potted. If the shoot has not already disconnected itself from the dead cutting, it should be carefully severed with a sharp knife. In the process of tubering, the behavior of the cuttings is essentially identical with that of real tubers, like those of the potato. The original cutting dies, but the sprouts that arose from it root at the base and form independent plants.

13. The rooted shoots should be potted in clean 2-inch earthenware pots in the standard blueberry-soil mixture already described.

14. The pots should be bedded in moist sand up to the rim in a glass-covered frame or box, well lighted but protected from direct sunlight, and slightly ventilated but with a saturated or nearly saturated atmosphere.

15. In order to secure rapid growth, the rooted plants should be gradually accustomed to a well-ventilated atmosphere and then to half sunlight, this adjustment extending over a period of about three to four weeks.

16. If preferred, the rooted shoots may remain in the original cutting bed until the following spring, the cutting bed being exposed during the winter to freezing temperatures, but mulched with oak leaves, and the plants may then be transferred, with their whole root mat intact, to a peat and sand nursery bed at a spacing of about a foot each way.

Where propagating is to be done on a sufficiently large scale, outdoor coldframes may be used instead of cutting boxes. Miss Elizabeth C. White, of New Lisbon, N. J., who has brought to-

gether the best existing collection of selected wild-blueberry stocks, has been propagating them with much success in muslin-shaded coldframes by the method of tubering, and she has much simplified the handling of the cuttings, both before and after rooting. The cuttings are made in the late fall, packed in boxes in loose, moist, clean sphagnum moss, and stored during the winter in a cool cranberry house at a temperature of about 40° F. As soon as the frost is out of the ground beds of clean sand are laid down in the coldframes and the cuttings are pressed into the sand until the upper side is level with the surface. The whole is then covered with an inch layer of sifted peat (about 2 parts) and sand (1 part). The frames are completely shaded by muslin on a framework about 7 feet above the ground, and ventilation is not begun until most of the shoots are rooted, about midsummer. The shades and sash are removed in early October, and in late autumn, after most of their leaves have fallen, the rooted plants are taken out of the frames, so that these can be made ready for a new lot of cuttings very early the next spring. The stronger of the rooted plants taken out of the frames are set at once in their permanent places in the field plantation. Those less strongly rooted are placed in nursery beds at a spacing of about 10 inches each way, where they remain during the winter and the following growing season.

Winter Cuttings.

The rooting of leafy cuttings of the blueberry in summer is very difficult, because in a temperature above 70° F. the cuttings blacken and die. With the aid of a shaded greenhouse, winter cuttings can be started early enough to make roots before warm weather comes on. Similar results can be secured in coldframes so located, sheltered, and manipulated as to prolong their low temperature as late as possible into the season.

The essentials of a successful coldframe for blueberry propagation are: (1) That it be located on the cool, shaded, north side of a building or in some other situation where it will not receive reflected heat from neighboring structures. (2) The frame must receive an abundance of light but no direct sunlight, a condition

best secured in the case of isolated frames by the use of clean white muslin shades. Frames on the north side of a building will also require shade in early morning and late afternoon from March to September. On sunless days all shades should be removed, so that the cuttings will receive as much light as possible. (3) There should be ample space for the circulation of cool air between the frames and the shade. A shade at the height of about 7 feet from the ground not only allows such circulation but makes it easy to work among the frames. (4) The frames should be kept closed until the cuttings are rooted. This closing not only keeps the air saturated with moisture and prevents the drying of the cuttings, but it also tends to maintain a cool ground temperature within the frame.

When frames are thus located, constructed, and managed, the maximum temperature on sunny days within the frames is often 10 degrees lower than the shade temperature outside, and the period of safety for cuttings that are not yet rooted is greatly prolonged. Low temperatures can be maintained in such coldframes much later in the season than in a greenhouse of the ordinary construction, even though the greenhouse is well shaded and well ventilated.

The use of a greenhouse in which to start the cuttings, followed by the transfer of the cutting boxes to coldframes at the beginning of warm weather, permits an even more prolonged protection of the cuttings than can be secured in either greenhouse or coldframe alone and increases the percentage of rooted plants.

The directions for rooting winter cuttings of the blueberry by the use of a coldframe are as follows:

1. Make the cuttings in late winter before the buds have begun to swell. If more convenient, they may be made in late autumn, after the leaves have fallen, laid rather loosely in clean moist sphagnum in a covered but ventilated box or other package, and stored until early spring on ice at a temperature just above freezing or in commercial cold storage at a temperature of about 35° F., if such storage is available.

2. Make the cuttings from wood of the preceding summer's growth, rejecting such portions as bear the large fat flowering buds. The cuttings are to be made from well-matured unbranched twigs or shoots grown in well-lighted situations, and therefore well stored with starch. Excellent wood for cuttings is afforded by the long stout shoots that grow the first

summer from a blueberry plant that has been pruned to the stump. In the swamp blueberry these have few or no flowering buds and often are 3 to 5 feet in height and a quarter of an inch or more in diameter at the base.

3. About 4 to 5 inches is a suitable length for finished cuttings. A sharp thin-bladed knife should be used. In the finished cutting the upper end of the diagonal cut at the base of the cutting should come just below a sound bud, and the cut at the upper end of the cutting should be about an eighth of an inch above a sound bud. If the cuts are first made with pruning shears, remove with the knife the bruised wood at the cut ends. The diagonal knife cuts should be as short as is practicable without bruising the bark or splitting or straining the wood. Cuttings that have been kept in cold storage should be recut at both ends, so as to present clean surfaces that show no discoloration. In order to avoid infection of the cuttings, the knife must be kept clean. This may be done conveniently by dipping the blade in alcohol and wiping it on a clean towel. The cuttings must not be allowed to become dry. This is easily prevented by laying them in the fold of a clean moist towel.

4. The coldframe may be of the usual form, the top about 1 foot above the surface of the cutting bed at the front and 2 feet at the back, and tightly constructed of material not less than an inch in thickness, with closely fitting sash of the ordinary kind. The cutting bed, 4 inches in depth, should be laid down over a groundwork of gravel or other material that will provide good drainage. On this groundwork place about 1 inch of clean chopped sphagnum moss and over the moss about 3 inches of pure clean sand. Moisten the sand with clean rain water or other pure water (free from lime) from a sprinkling pot.

5. After making deep slits at suitable intervals in the sand with some clean implement, set the cuttings in the slits at a spacing of about 2 to 3 inches each way according to size, the base of the cutting being in the sand a little above the sphagnum, and see that the sand is so closely and firmly packed about the base of the cutting that the cut surface is in contact with the sand, but be careful not to injure the delicate raw tissue at the base of the cutting by pushing forcibly into the sand. Smooth the surface of the bed by a final watering. Cover the frame closely with the sash, so that the air within will be moist.

6. Do not allow the temperature inside the frame to go above 65° F. Prolonged temperatures above 70° are likely to ruin the cuttings. Do not, on the other hand, allow the cutting bed or the cuttings to freeze.

7. Shade the frame with white muslin at a height of 2 to 7 feet above the frame, so as to keep the sunlight off the glass and at the same time to permit a sweep of air between the glass and the shade. The shade should be so arranged as to be removable on cloudy days or at any time when the frame is shaded by other objects.

8. Keep the air inside the box saturated or nearly saturated with moisture. This condition will be shown by the condensation of the moisture on the under side of the glass at night or at other cool portions of the day.

9. Watering should be as infrequent as practicable, only sufficient to keep the sand moist but well aerated and the atmosphere in the box saturated. If the sash fits tightly, the period between necessary waterings may extend over several weeks.

10. After the cuttings have callused at the base, the new twigs have pushed from the upper buds and their growth has been terminated by the browning of the tips, and the new leaves have reached their full size and acquired the dark-green color of maturity, when the formation of roots is about to begin, the surface of the bed is to be mulched with about half an inch of a mixture of sifted peat, 2 parts, and clean sand, 1 part, carefully watered after application, so that some of the acid water from the peat will be carried down into the sand bed about the base of the cuttings.

11. When all or most of the cuttings in the frame have begun to root, ventilation of the frame should be begun. The best superficial evidence that a cutting has rooted is the development of secondary twig growth, either from the apex of one of the first set of new twigs or from another bud lower down on the old wood of the cutting. If secondary growth does not take place, the development of a plump but dormant bud at the apex of one of the leafy twigs is also good evidence that the cutting has begun to root. Cuttings that are healthy but not yet rooted at the time ventilation begins usually die from excessive transpiration.

12. Ventilation should be only slight at first and should be increased very gradually, the transition to full ventilation extending over a period of several weeks. If any of the sensitive secondary growth begins to wilt, reduce the ventilation immediately until the wilting ceases. Be especially careful not to give too much ventilation on windy days.

13. All cuttings that are dying should be removed from the bed at once. Those injured by too high temperature usually turn brown at the base first, the dead area progressing upward until the new growth collapses. Those otherwise sound but suffering from excessive ventilation before they are rooted usually indicate their bad condition by the marginal yellowing of their leaves before they drop and the stems become withered.

14. The plants are best left in the open coldframe all winter, mulched with leaves, preferably oak leaves, and in the early spring, before the buds have begun to push, they should be very carefully lifted and moved, with the whole root mat and adhering soil intact, to a peat and sand nursery bed at a spacing of about a foot each way.

Root Cuttings.

The early experiments with root cuttings gave such a small percentage of rooted plants that further experiments in the greenhouse were abandoned. At Whitesbog, N. J., however, in order that the

roots as well as the tops of selected wild plants might be utilized, cuttings of the roots were made about 3 to 4 inches long and of all sizes down to a little less than an eighth of an inch in diameter. These were given the same treatment as tubered cuttings in cold-frames. A high percentage of rooted plants resulted. This may prove to be one of the most satisfactory methods of propagating plants that have large root systems.

Treatment of Young Plants.

When blueberry plants, either large or small, are grown in porous pots, the surface of the pot should never be allowed to become dry, for the rootlets which grow through the soil to the wall of the pot for air are extremely fine and easily killed by drying, to the great injury of the plant. This danger may be eliminated by bedding the pots to the rim in a well-drained bed of sand or by setting the pot in another pot of 2 to 4 inches greater diameter, with a packing of moist sphagnum moss between and broken crocks at the bottom.

A burning of the young leaves and growing tips of twigs is often produced by the hot sun from the middle of June to the middle of September. Plants in pots or nursery beds are easily protected from such injury and forced to their maximum growth by a half-shade covering of slats, the slats and the spaces between being of the same width. On cloudy days the shade should be removed. It should not be used in the fall or spring.

During the winter the rooted cuttings, or 1-year-old plants, should be kept outdoors, exposed to freezing temperatures, their soil mulched with leaves, preferably oak leaves. When kept in a warm greenhouse during the winter they make no growth before spring. Even then their growth is abnormal, often feeble, or sometimes deferred for a whole year.

Field Planting.

Plants from cuttings or rooted shoots are ready for permanent field planting when they are 1 or 2 years old and 6 to 18 inches high.

It is a curious fact that these plants send out no new roots in

spring until they are in full leaf, when their flowering is nearly or quite finished and their principal twig growth has ceased. It is important, therefore, in taking up either a wild or a cultivated plant from the open ground that as much as possible of the old root mat be carefully lifted with the plant, for upon this the plants depend for moisture until their new rootlets are formed.

In the case of mature wild bushes with very large root systems, when it is practicable to secure but a fraction of the root mat, say a disk only 3 or 4 feet in diameter, it is the best procedure to cut all the stems at the time of transplanting to stumps 1 to 2 inches high. The bush will then produce a new and symmetrical top of a size suited to the capacity of the roots. The wood that is removed may be used for cuttings if the plant is sufficiently valuable.

The stems that make up a bush usually develop fibrous roots on their basal portions beneath the surface of the soil and above the root crown, at which the several stems unite. Such plants can be divided into several when taken up for transplanting. As many as 30 plants, each cut to a stump and with its own small but sufficient portion of the root mat, have been secured in this way from a large wild plant. By utilizing the various methods of propagation described in this publication as many as 600 cuttings of roots, stems, and twigs have been made from a single very large wild bush.

In resetting plants from which the tops have been removed, the stumps should be made to project about an inch above the surface of the ground. New shoots are formed in spring from such exposed stumps much earlier than from stumps covered with soil and not receiving the warmth of the sun's direct rays. If the plant when reset is made to occupy a moderate depression in the ground, the old stump and the bases of the new stems can afterward be covered with soil and a new root system will finally develop from the new wood.

When blueberry plants are set out in early spring, before the buds have begun to push, they usually make excellent growth, and for all plants that are pruned to the stump early spring is the best season for transplanting.

Conditions with unpruned plants, however, are different. Since blueberry plants make no new root growth until late spring, it often happens that a period of hot days intervenes between planting and

rooting, and many plants are injured by an excessive loss of water before they have had time to make connection with the water supply of the surrounding soil through the development of new roots. The danger of such injury is greatest in the case of plants transplanted from pots. The old root ball sends up most of its water to the leaves, and in consequence, being at first, as a rule, in imperfect capillary contact with the new outside soil, the root ball commonly contracts slightly. The contraction is often sufficient to put the roots at the surface of the root ball permanently out of contact with the surrounding soil, and the plant may continue to suffer severely from drought, although the soil outside the root ball contains plenty of moisture.

An early autumn field planting has furnished a remarkably successful means of avoiding this trouble with potted plants. At this season the excessive heat of summer is over, the plants are in full and vigorous leaf, and, being taken from pots, carry their whole root system with them. The formation of new roots begins at once and proceeds with great activity until the leaves are shed, at the approach of winter. In the spring, when new leaf growth begins, the plants are already well rooted in the soil. They pass through the early hot period without injury and develop remarkable size and vigor by autumn.

In preparing for a field plantation one precaution of special importance must not be overlooked. For the production of a crop of fruit under field conditions, insects are required to carry pollen from one flower to another. The honeybee works little on blueberry flowers. Her tongue is so short that she can not easily reach the nectar. The flowers are pollinated chiefly by bumblebees, whose tongues are long, and by some of the solitary wild bees that are small enough to crawl through the narrow opening of the corolla. When blueberry flowers are pollinated with pollen from their own bush the berries are fewer, smaller, and later in maturing than when the pollen comes from another bush. Some bushes are almost completely sterile to their own pollen. The pollen of a plant grown from a cutting is likewise unsatisfactory for the pollination of the parent plant or of other plants grown from cuttings of it. It is important, therefore, that a plantation should not be made up wholly from cuttings from one bush. Two stocks should be

used, a row of plants from one stock being followed by a row from the other.

In the permanent field plantation the bushes should be set 8 feet apart each way. When they reach mature size they will nearly or quite cover the intervening spaces.

When blueberry culture is to be tried in a sandy or gravelly soil deficient in peat or peatlike matter, the plants should be set in separate holes or trenches about 12 inches deep in a mixture of two to four parts of peat or half-rotted oak leaves to one part of clean sand. The excavations should be wide enough to provide ample space for new growth of the roots, not less than a foot each way from the old root ball. In small plantings, if the materials for the mixture are easily available in quantity, an 8-inch bed of it may be laid down over the whole surface of the ground, and if a planting is to be tried on a soil wholly unsuited to the blueberry, the area may first be covered with a 6-inch layer of sand, the bed of peat and sand mixture being then laid down on top of the sand layer. Wherever used, the peat and sand mixture should be thoroughly manipulated, so as to give it a uniform texture before the plants are set out in it, for in a soil in which layers of peat alternate with layers of sand the capillary connection of the two is usually imperfect, and a plant rooted in the peat may suffer severely from drought, although the neighboring sand still has water to spare. For a similar reason it is important that when the plant is first set out, the peat and sand mixture shall be very tightly pressed and packed about all sides of the old root ball.

To secure full vigor of growth the ground between the bushes must be kept free from all other vegetation. On rocky uplands or in situations deficient in peat a continuous mulch of oak leaves, when it is practicable to secure them, will help toward this end, as well as keep the soil in the necessary acid condition. It is more economical, however, to choose such a location for the plantation as will permit the use of horse-drawn machinery and will make mulching unnecessary.

The most favorable location for blueberry culture is a moist area with a peat covering and sand subsoil, the peat preferably of such a thickness that deep plowing will turn up some of the underlying sand.

The land should be so ditched that the water level can be kept at least a foot below the surface of the ground during the growing season.

The ground should be plowed to the depth of about 8 inches and repeatedly harrowed or otherwise tilled during the season preceding the planting, in order to kill the wild vegetation. The best time for such plowing is late spring, after the principal vegetation has used up its winter store of starch in completing its early growth and before the leaves have matured and the roots have begun the new storage of starch with which they can send up new sprouts.

The tillage of the plantation after the young bushes have been set out should be sufficiently thorough to keep down all competing vegetation. This is best done by horse cultivation, with careful hand hoeing and hand weeding close about the plants. As the bushes grow older and their roots extend into the spaces between the rows, they develop root mats close beneath the surface of the soil. The tillage over these root mats should be very shallow, not more than 2 or 3 inches. This is probably best accomplished by the use of a small, light spring-tooth cultivator with the teeth set closer together than usual.

In case of drought, the drainage ditches may be used to bring in water for subirrigation. But unless the surface of the ground is very level, subirrigation is likely to result in the injury of plants in the lower spots by excess of water. In uneven areas, therefore, surface irrigation, if accompanied by good drainage, is preferable to subirrigation and should be used if practicable.

Fertilizer experiments have shown that lime is positively injurious to blueberry plants and that stable manure, while producing a temporary stimulation of vegetative growth, is likely to cause serious injury later. For those desiring to experiment with fertilizers the following acid mixture is recommended, applied at the rate of 1,000 pounds per acre, or one-fifth of a pound per square yard:

	Pounds.
Acid phosphate (high grade, about 16 per cent available phosphoric acid)	600
Sulphate of potash (50 per cent potash)	200
Sulphate of ammonia (20 per cent nitrogen)	200

(Muriate of potash may be substituted for sulphate of potash.)

This and similar acid mixtures have been used with success on blueberry plants in both pot and field experiments, with no evidence thus far of cumulative injurious effects. However, as no fertilizer is required to make the swamp blueberry fruit abundantly and continuously in suitable peat and sand soils properly handled, the use of fertilizers in commercial plantations is not at present advocated.

The swamp blueberry does not require a yearly pruning. When one of the stems of a bush becomes unproductive from injury or old age it should, of course, be cut out. If a large part of a bush needs removal it is better to cut all the stems to the ground and let the plant send up new shoots, all of the same age, to form a wholly new and symmetrical top.

Yield and Profits.

By proper manipulation in the greenhouse, seedling blueberry plants can often be made to ripen a few berries in less than a year, but they do not come into commercial bearing in field plantations until they are 3 to 4 years old, when the plants are 1 to 3 feet high. They then increase slowly to full size and full bearing. Wild bushes of the swamp blueberry live to great age, often 50 to 100 years, still bearing heavily, and they often attain a height of 6 to 8 feet when growing in full sunlight; still more when shaded. Individual stems may remain productive for 10 to 25 years. When dead they are replaced by new and vigorous shoots from the root.

The field plantings resulting from the recent experiments in blueberry culture are too young to show the mature yield. Fortunately however, there is, near Elkhart, Ind., a small blueberry planting of mature age. The returns from this plantation set forward our knowledge of yields by at least a decade. The plantation is about $2\frac{1}{2}$ acres in extent. It was started in 1889 in a natural blueberry bog, which was first drained and then set with unselected wild-blueberry bushes. The plantation was profitable from the first, but exact records of yield and receipts are available only for the years 1910 to 1915, when the plantation was 21 to 26 years old. The data are shown in Table I.

TABLE I.— *Yield and receipts from a plantation of blueberries near Elkhart, Ind., 1910 to 1915, inclusive.*

Year.	Yield per acre.	Price (approximate average per quart).	Receipts per acre.	Profits per acre.
	Quarts.	*Cents.*		
1910 (a year of "almost total failure" because of late spring freezes)	419	17⅛	$71.87	$10
1911	2,266	12⅞	292.44	139
1912	2,379	12⅞	305.75	147
1913	1,770	15⅛	267.64	139
1914 (a year of severe midsummer drought)	1,397	14½	201.94	92
1915	2,214	14½	321.00	170
Average for the 6 years	1,741	14½	243.44	116

The annual expenses for weeding, cultivation, and irrigation were about $20 per acre. The cost of picking was 5 cents a quart. The general cost of maintenance of the equipment was about $2 per acre per year, the crates and boxes being used repeatedly. The computation includes an estimated annual charge of $12 per acre for interest, $2 for taxes, and $4 for depreciation or sinking fund.

It must be borne in mind that these figures are based on the yields from wild bushes transplanted without selection as to individual productiveness or the size of the berries. With bushes propagated from selected varieties, the yield should be greater and the berries much larger, this greater size probably effecting a reduction in the cost of picking and certainly an increase in the selling price.

Only a beginning has been made in the improvement of the blueberry. In a series of experiments involving the selection of superior wild strains, the growing of hybrids, and the forcing of choice varieties to quick fruiting by budding them on strong seedling stocks, berries seven-eighths of an inch in diameter have already been produced in the greenhouse. The yield and profits from such bushes in field plantations are not yet known.

Conclusion.

The introduction of the blueberry into agriculture has a much more profound significance than the mere addition of one more agricultural industry to those already in existence. Blueberries thrive best in soils so acid as to be considered worthless for ordinary agricultural purposes. Blueberry culture, therefore, not only promises to add to the general welfare through the utilization of land almost valueless otherwise, but it offers a profitable industry to individual land-owners in districts in which general agricultural conditions are especially hard and unpromising, and it suggests the possibility of the further utilization of such lands by means of other crops adapted to acid conditions.[1]

[1] For a discussion of the principles of acid-soil agriculture in districts in which the cost of lime is prohibitory, consult "The Agricultural Utilization of Acid Lands by Means of Acid-Tolerant Crops," United States Department of Agriculture, Bulletin No. 6, 1913.

ECONOMIC BOTANICAL EXPLORATIONS IN CHINA.

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Many of our most valued plants are really immigrants. I will enumerate only a few. For instance, wheat has come from Palestine and Syria; barley also; oats from Europe; corn (maize) from Central America; rice from India; apples from Europe and Central Asia; pears from Southwestern Europe; peaches from China; cherries from Asia Minor; vinifera grapes from Central Asia; oranges from Southern China; olives from regions around the Mediterranean; walnuts from China, Persia, and the Caucasus; hazelnuts from Southern and Western Europe; the so-called Irish potato came from the islands off the coast of Chili, South America; sweet potatoes from South America; peanuts and tobacco also; cucumbers and eggplant from India; and watermelons and sorghum from Africa. Our ornamental trees, shrubs, and herbs have been collected from the four quarters of the compass.

In introducing new plants, man has found out that the closer the climate a plant originally comes from resembles the one it is brought into, the better it will thrive. Now, certain regions on this globe resemble at large climatically and topographically the United States very much indeed, and of all countries China resembles North America very closely. And not only that climate and general appearances are much alike, but the Floras of both countries have much in common. A person having been suddenly transferred from some part of the South Eastern United States, or vice versa, would scarcely know at times where he really was.

The United States Department of Agriculture knew many of these facts, and a good many more, and as it is pretty nearly impossible to get enough data and material through correspondence, it was decided to make a thorough exploration in China along agricultural and horticultural lines, and I was selected to do this

interesting task. I made three separate trips into China and adjoining countries. These trips have covered a period of almost nine years.

China can be divided roughly into two zones, that is, the northern parts, which are semi-arid with cold, dry winters, while the central and southern sections are humid and have mild winters. My work has been primarily in Northern China because we have a special need in this country for real hardy plant material. In North China one finds rugged mountains with bits of forests still left, while the plains are cultivated to an extent that cannot be realized by those who have never seen the country.

The Chinese peasants have no regard for the wild vegetation, and they cut down and grub out every wild woody plant in their perpetual search for fuel. One therefore finds it exceedingly hard to discover anything of importance near centers of population, and a man is obliged to go into the real interior, often many weeks' march away from any large center. This necessitates, of course, being burdened with large quantities of equipment, required to camp out, and this is one of the banes connected with exploration work in the interior of China.

Every traveler carries with him bedding, washbasins, candles, soap, cooking utensils, supplies of all kinds, and what not else. And the filth in the country inns is sometimes beyond description.

However, one often is rewarded for all the difficulties experienced, for there are glorious blue mountains in China and lovely valleys and ravines, and when one does strike a monastery or a temple in some secluded mountain nook, where the original wild vegetation has been preserved by the priests, one feels fully compensated for the trials gone through.

The Western world does not quite realize how much we are indebted to the priests of the various sects of Buddhism and Taoism in China for having protected the wild plant growth around the temples. If it were not for them many a species or variety of plant which now adorns our gardens and parks would have been exterminated. And these priests not only protect and save the wild vegetation around their places of abode, but they also plant rare specimens in their gardens and courtyards. Around Peking one finds certain trees, such as *Catalpa bungei*, *Pinus bungeana*,

Aesculus chinensis, Xanthoceras sorbifolia, only planted in temple compounds; they do not occur wild any longer within the vicinity of that city, though apparently they formerly did so.

In speaking about these fine trees found in temple courts, there is one that impresses more than any other, and that is the white barked pine, *Pinus bungeana.* For serene impressiveness there is nothing to equal it. We have here the strange case of nature having invented the white-washing process of the trunk and branches so as to save the tree from being hurt by the strong sun in winter as well as in summer. The moment a branch dies it becomes black, and the contrast between dead and alive wood is really remarkable to behold. While Dr. Augustine Henry and Mr. E. H. Wilson found this pine wild only in Northwest Hupeh, I found it in the mountains of Southeast Shansi, in Central Shansi, and in South Kansu, and apparently it occurs in Honan also.

Among conifers that resist drouth, alkali, and extremes of temperatures to a fair degree, North China has given us *Thuja orientalis, Juniperus chinensis, Pinus sinensis,* and *Pinus bungeana.* China is remarkably rich in ornamental shrubs, and it is especially due to the very great successes of the well-known botanical collector, Mr. E. H. Wilson, of the Arnold Arboretum, that the Western world now has her gardens enriched by a few hundred of new species.

Of the numerous flowering shrubs that exist in China, I introduced *Viburnum fragrans* into the United States by sending scions from plants near Peking, but if it had not been for the expert plant propagator, Mr. Jackson T. Dawson of the Arnold Arboretum, who saved this material, we would not have this interesting shrub now.

Another interesting plant we introduced is the *Rosa xanthina,* a hardy, yellow bush-rose, occurring in its semi-double form, cultivated in gardens in Peking and Tientsin, but the single form I found wild in dry mountain gullies in the provinces of Shansi and Shantung. As a factor in hybridization experiments, it is of unusual value, and entirely new strains of hardy yellow roses may possibly originate from it.

One of the most remarkable discoveries I made was only a few months ago when I found a real hickory in China. Prof. C. S. Sargent, the eminent director of your beautiful Arnold Arboretum, has named it as *Carya cathayensis,* and paid me the compliment of

pronouncing it "the most interesting botanical discovery made in a generation."

It is strange to see how the Chinese gardeners with their primitive methods have learned how to master the propagation of certain plants. One finds, for instance, that in north China chrysanthemums are grafted upon a biennial Artemisia, which is very resistant to drouth, alkali and rough handling. In Central China again, where there is no alkali, a perennial wormwood is used for the same purpose, *Artemisia vulgaris*, var. *indica*.

In the provinces of Honan and Chihli, *Syringa meyeri* is grafted on *Ligustrum quihoui*, while around Shanghai, *Syringa oblata* is put high up on *Ligustrum lucidum* so as to make standard specimens of them.

The tea olive, *Osmanthus fragrans*, which grows on its own roots in central China, is grafted on the Chinese fringe tree, *Chionanthus retusa*, in the province of Shantung, while in the other northern provinces one finds it grafted on *Ligustrum quihoui*.

In Peking and Tientsin, *Prunus triloba*, *Prunus tomentosa*, flowering apricots and flowering peaches are all grafted on the remarkable drouth and alkali resistant *Amygdalys davidiana*, and since this stock is a very early one, the Chinese use it extensively in forcing.

The tree peony, *Paeonia suffruticosa*, is generally grafted on the roots of a very hardy herbaceous peony, *Paeonia albiflora*. Various species of rare junipers are put on oriental arbor vitae stock, *Thuja orientalis*. The ordinary pear from north China thrives to perfection on a very drouth resistant stock, which bears fruits not larger than the size of peas, *Pyrus betulaefolia*. Persimmons, *Diospyros kaki*, are grafted in north China on the "Ghoorma," *Diospyros lotus*, while in central China wild forms of kakis are employed.

In Soochow I have seen a yellow-berried ivy, *Hedera himalaica*, grafted high up on the stem of an Aralia, and a large flowering snowball, *Viburnum macrocephalum*, put on the stem of another species of Viburnum, while in Shansi standard tea roses are grafted on strong stems of *Rosa xanthina*, which is very resistant to alkali and dry heat.

The Chinese in north China have greenhouses, but instead of

having glass roofs, they have a mud roof, which only slightly slopes, and to admit light, they have a vertical front, always on the South, composed of stems of the great sorghum plant, *Andropogon vulgare*, which are covered over with strong transparent paper. Not having any stoves, hot water, or steam apparatus, the heating is done by means of flues and still with all these primitive arrangements they are able to force various plants into bloom, such as magnolias, *M. conspicua;* lilacs, *Syringa meyeri;* peonies, *Paeonia suffruticosa;* snowballs, *Viburnum fragrans;* flowering plums, *Prunus triloba;* flowering peaches and others, and they grow even cucumbers in these greenhouses, of which the young fruits are sold at high prices in winter and early spring.

As garden and park architects the Chinese are wonderfully clever, much more so than the world knows. Japan has been given all of the credit for beauty and daintiness of her gardens and parks, but in my opinion, a well-laid-out Chinese park is fully as interesting, and possesses even stronger outlines. Take, for instance, the park of the summer palace near Peking, there are very few parks in the world that can match it in striking beauty. We, here in America, certainly ought to have a real Chinese park in one of our progressive cities. Why could not Boston take the initiative?

Our Government is engaged upon the introduction of many important Chinese fruits, and I can only give you a rough outline of this work. There are in China hundreds of varieties of persimmons, and not only are they eaten fresh, but some varieties are dried like figs and resemble the last in looks and taste very much. They even make a liquor from some of them, also vinegar and even a special kind of sugar. Then there is the jujube, *Zizyphus jujuba*, a fruit very much like a Persian date, of which there also are a few hundred varieties in existence. This fruit tree is especially fit for regions with long hot summers, and a limited rainfall, such conditions prevailing in Texas, California, and other southwestern states.

The Chinese have found out that by "ringing" certain varieties every year by running a saw through the bark all around the main trunk, they can make them bear much heavier than by leaving them alone. It is curious to find out that the peasants in Zante, Greece, have this very same practice of ringing their currant vines every spring for the very same reason. One naturally asks oneself

how is it that two peoples so wide apart have adopted the same practice, but on different crops.

Another fruit of promise for extreme southern Florida and perhaps southern California, is the Litchi, which is well known to the American public in the dry state. It is a delicious fruit when fresh, and in China it is as popular as strawberries are with us.

The Chinese have also developed out of one of their haws, *Crataegus pinnatifida*, some varieties that bear large fruits which are fine for preserves. One really is surprised to notice how little interest the Americans have taken in the hundreds of species of haws which are indigenous here, and some of which produce excellent fruits. If some of you care to pay a visit to the wonderfully beautiful Arnold Arboretum at the time the haws are ripening, you will be amazed at the great number of promising forms, which are all native to the United States.

As the closing subject I want to draw your attention to the bamboos; no plant is higher estimated in China than bamboo, and the number of uses it is put to is legion. There is a saying in China that one can use bamboo in as many ways as there are days in the year. There are three distinct uses for bamboos, however; the first is to employ it as timber, and special kinds are grown for this purpose; the second is as a vegetable for its edible sprouts, and the third is for ornamental purposes. There are already some beautiful and large bamboo groves on private estates in this country, one near Savannah, Georgia, one at Abbeville, Louisiana, and one near Bakersfield, California, and a century from now perhaps bamboo will have become as common a sight in our southern states as it is in China and Japan.

SWEET PEA DISEASES AND THEIR CONTROL.

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The John Lewis Russell Lecture.

Many of us still remember the day when the hollyhock was a favorite flower, both in England and in this country. The hollyhock, however, has had its day. Accustomed, as we were, to giving it the place of honor in our gardens, it is now neglected and is hardly being considered as an ornamental flower. This change of attitude was painfully and not willingly adopted by growers. Numerous diseases especially the rust (*Puccinia malvaccacrum* Mont.) have practically made it impossible to grow this once ornamental plant. The sweet pea is now undergoing similar critical conditions. Numerous diseases are threatening its existence as a cut flower of economic importance. In England, growers are very much discouraged because of these diseases. In the United States, where this flower is gaining in popularity, conditions are not different.

There are few florists today who do not attempt to grow sweet peas. The majority start with enthusiasm and hope of success. However, many meet with reverses and give up in despair. On an average, all growers start right as far as cultural requirements are concerned. Why is it that so many fail? Failures with sweet peas are not mere accidents. They are due in most part to specific diseases caused by definite parasites. These diseases either so weaken the plants as to render them unfit for production or else kill them outright. Ninety percent of failure with greenhouse sweet peas, especially, may be directly accounted to sick soils, i. e. to parasitic fungi present there which make plant growth impossible.

Diseases of Indoor Sweet Peas.

The following are some of the more important diseases which attack greenhouse sweet peas.

Root rot, *Corticum vagum* B. and C.

This trouble is of considerable importance to greenhouse men. The disease may destroy the entire stand, or cause it to be uneven, thus necessitating several resowings. Severely infected plants have practically no root system. In less infected plants only one or two rootlets may be destroyed. The fungus produces a browning effect of the root before total destruction sets in. In very early stages of infection the seedlings are seen to have a wilted appearance; as the disease progresses the infected seedlings fall over and collapse. The fungus is not confined to the roots alone. It is often seen to work its way up the stem and produce a constricted area marking it off from the healthy part. The fungus being a soil organism is usually introduced with manure, infection taking place at any part of the roots or stems. In the latter case reddish sunken spots are observed at the base. Root rot is primarily a seedling disease, although older plants, too, may be affected. Such plants linger for some time and are valueless. *Corticum vagum* is a soil fungus which attacks a number of other greenhouse as well as outdoor plants. In this case, the organism either produces a damping off among young seedlings, or deep cambium lesions on the stem. With sweet peas the injury is the same. Root rot is introduced in the greenhouse with infected soil or manure. Over watering and a sour condition of the soil favors the disease.

Fusarium Wilt, *Fusarium lathyri* Taub.

This disease is of much greater importance to greenhouse men than root rot. The writer has known of instances where the disease has ruined the entire crop of indoor sweet peas. After several resowings, the owners gave up in despair the attempt to grow it further. Florists should do everything to prevent its introduction

in the house. In places where this disease has made its appearance the growing of greenhouse sweet peas had to be abandoned within less than two years. The disease produces a sudden flagging of the leaves which is accompanied by a wilting and collapse of the seedlings. Usually, upon sowing the seed, a fair percentage germinate and reach the height of about eight to ten inches, when they are attacked by the fungus. If the collapsed seedlings are allowed to remain on the ground, the dead stems will soon be covered with the sickle-shaped spores of the Fusarium fungus. Eventually the dead tissue rots, attracting small fruit flies which now begin to distribute the spores to different places in the same house. The trouble usually manifests itself in widely separated spots on the bench. These spots, however, quickly spread, involving the entire bed, which may suddenly assume a wilted appearance. Here and there, however, and in the same bench, a few plants remain alive and keep on growing in spite of the disease.

Stem or Collar rot, *Sclerotinia libertiana* Fckl.

This is usually a seedling disease, although it may attack plants of all ages. Like the Rhizoctonia rot it attacks many different kinds of seedlings. The trouble is most severe in houses poorly ventilated and in beds over-watered or lacking proper drainage; and in damp places out-of-doors. The disease spreads very quickly and is soon fatal. Affected plants first show a wilting of the tip and flagging of the leaves, and then the seedlings fall over and collapse. The cause of this disease is a fungus (*Sclerotinia libertiana* Fckl.), which also causes a drop disease of lettuce and of other plants. The fungus does not seem to attack the roots, but penetrates the collar of the stem and completely invades the vessels, thus clogging the upward flow of the water from the roots to the stem. Freshly collapsed plants usually have a water-soaked appearance, and are later overrun by a white weft, which is merely the mycelium of the fungus; this is followed by sclerotia (resting bodies), which are found scattered here and there on or within the affected stems. The fungus is a soil organism which occasionally causes trouble in clover fields. It is introduced with animal manure.

Thielavia root rot, *Thielavia basicola* Zopf.

Chittenden [1] and Massee [2] have suspected the fungus *Thielavia basicola* to be the cause of "Streak." This latter disease, Manns and Taubenhaus [3] have shown to be of bacterial origin, and related to a bacterial disease of the clovers. Plants severely infected with Thielavia have practically little or no root system, since the latter is destroyed by the fungus as rapidly as the roots appear. Whatever root system be present is of a stubby nature, charred in appearance. The fungus sometimes works up on the stem to a distance of 2 to 3 inches above ground, but never to the extent of invading the entire stem. It is probably due to this blackened appearance of the roots and of the stem nearest the ground that some workers have mistaken this disease for the well-known "Streak" disease. Chittenden, in his report to the National Sweet Pea Society of England, gives an accurate description of the "Streak," so that there can be no doubt but that he had the disease well in mind, that is, he described it as a stem disease. The Thielavia disease, as already mentioned, is not a stem but a root disease.

Chittenden seemed to have been unable to infect healthy sweet pea seedlings with the fungus *Thielavia basicola* under normal conditions of growth. It was only when his plants were subjected to over-watering that the fungus became an active parasite. In our inoculation experiments, healthy sweet pea seedlings have been readily infected by placing the Thielavia fungus on the roots of plants growing in sterile soil. In two to three weeks the roots were thoroughly diseased. Over-watering was not found necessary to bring about infection, although such treatment as well as injury to the roots favors the fungus in its activity.

The fungus *Thielavia basicola* is a very common source of seed-bed trouble in tobacco and trucking districts in the United States. Plants infected with *Thielavia basicola* do not quickly die; they

[1] Chittenden, F. J. Diseases of the sweet pea. Sweet Pea Annual: 14–24, 1912. England.

[2] Massee, George. A disease of sweet peas, asters and other plants — Thielavia basicola Zopf. Roy. Bot. Garden. Kew. Bul.: 44–52, 1912.

[3] Manns, T. F. and Taubenhaus, J. J. Streak, a bacterial disease of the sweet pea and clovers. Gard. Chron. (London): 215–216, 1913.

may linger for a long time, or indeed sometimes throughout the entire growing season. However, such infected plants remain very dwarfed, and are practically useless for flower production.

Root Knot or Nematode, *Heterodera radicicola* (Greef) Muller.

The disease is characterized by swellings on the roots. These are either small swellings formed singly, in pairs, or in strings, thus giving the affected root a beaded condition, or the swellings may be very large so as to be mistaken for root nodules. However, these galls cannot be mistaken for the normal root nodules, because the latter are lobed and are attached at one end, whereas the root gall produces a swelling of the entire surface of the part affected. Infected plants usually linger for a long time, but they can be distinguished by a thin growth and yellow, sickly looking leaves and stems. The disease is introduced with infected manure or with compost.

Mosaic.

Of all the greenhouse diseases, none challenges so much the skill and attention of the grower as this trouble. The great difficulty with mosaic is that we do not yet know the cause, although every indication points to its being a disease which is being induced by a specific parasite. Serious as this disease is, it may be kept in check, provided, of course, the grower recognizes certain fundamental facts. Mosaic is carried from diseased into healthy plants by the bites of insects. Aphids, especially, are great carriers of mosaic. Ordinarily winter-flowering sweet peas are not sown directly in the benches in the house. The seeds, as a rule, are at first sown in pots which are kept in a cold frame outdoors. The seedlings, as they grow up, are open to the attacks of the green aphid and several other insects which carry the germ from neighboring older sweet pea plants. As the young seedlings are taken into the house to be planted permanently on the benches the disease too is introduced with them. Moreover, as is usually the case, some of the aphids are also brought in. These soon begin to reproduce and to establish themselves well in the greenhouse. In

the meantime, too, the transplanted seedlings are now beginning to show definite symptoms of mosaic, and the trouble is now spread about by the new broods of these plant lice. It becomes therefore obvious that if instead of allowing the potted plants to remain outdoors until they are ready to be taken indoors, they be kept from the very beginning inside in a protected cold house, they will remain free and non-infected. In bringing in clean plants there will be no mosaic to bother us. This is indeed very simple and is the only way as far as is known to control mosaic on indoor sweet peas.

Mosaic is readily distinguished by a yellow mottling on the leaves, presenting in some instances, a beautiful mosaic structure, hence the name of the disease. This, however, is not the only symptom. Diseased plants exhibit a curling of the leaves, resembling the curling induced by the green aphids, but in this case, the plant lice do not curl the sweet pea leaves. Mosaic makes its appearance when the seedlings are from three to four weeks old. Often the trouble is so bad and the curling so pronounced that the plants thus affected cannot make any headway but remain dwarfed and wrinkled and twisted. Occasionally, however, diseased plants grow with the disease keeping pace. In this case, too, the affected host is useless, as far as commercial purposes are concerned, since the blossoms, too, are twisted and they are borne on short crooked peduncles.

Powdery Mildew, *Microsphera alni* (Wallr.) Salm.

The sweet pea mildew was first described by Massee [1] as being prevalent in England. *Erysiphe polygoni* was attributed as the cause, both of sweet pea mildew and that of the edible garden pea. In this country, the disease is very prevalent on greenhouse sweet peas, and outdoors during wet seasons. Ordinarily, however, in small garden lots, and especially where the plants do not receive any water, the disease is practically unimportant since the attack is usually very mild during the active season, but becomes some-

[1] Massee, G. Fungoid diseases of the sweet pea. Sweet Pea Annual: 20–21, 1906, England.

what more abundant when the plants have passed all usefulness. The writer had the opportunity of collecting specimens at random from six large houses, and from three acres of outdoor sweet peas in Massachusetts and from a similar three acre plantation in Pennsylvania. So far, the writer has only met with the conidial or oidium stage. On our own sweet pea field, we have carefully watched for a perithecial stage but without success. Late in the fall, badly infected leaves have been collected and put away to winter over, but that material has failed to develop perithecia.

Recently Blodgett [1] claimed to have found the perfect stage of this mildew, which he referred to the species *Microsphera alni* (Wallr.) Salm.

Physiological Troubles.

These troubles are usually induced by improper conditions of the soil. Root burn, for instance, may be induced by the excessive use of wood ashes applied with the manure. It is not uncommon for growers to use wood ashes at the rate of 1500 lbs. to 4500 square feet of bed space. This would be equivalent to nearly seven and one-half tons per acre. Under such conditions the roots actually burn up because of the strong alkalinity of the soil. Moreover hard-wood ashes contain about 30% caustic lime and from 5 to 12% potash. Both of these elements in excess in soil render it too alkaline for plant growth. To remedy this trouble, use acid phosphate followed by a good drenching of water. This will help to neutralize the alkalinity and restore the balanced food ration.

Bud drop. As the name implies the young flower buds at a very early age turn yellow and drop off. This drop should not be confused with the drop produced by the anthracnose disease. In the latter case, the flower develops into a normal spike but it is attacked soon by the fungus *Glomerella rufomaculans* which girdles it at a point of attachment between the flower and the peduncle. Here the flower often drops off, leaving behind the beheaded peduncle. In the latter case, however, the minute young flower bud never develops, instead it turns yellow and drops off. There

[1] Blodgett, F. M. Sweet pea Powdery mildew. Phytopath. 5: 237, 1915.

seems no doubt that the drop is a physiological disease and is induced by an unbalanced condition of food elements in the soil. This may occur in a soil that has been excessively fed or in a soil that is lacking in plant food.

Bud drop may be readily remedied by the application to the soil of small quantities of muriate of potash and acid phosphate.

Outdoor diseases of sweet peas.

All the diseases considered under the heading of indoor diseases are not confined to greenhouse sweet peas alone. Outdoor plants, too, are susceptible to the same troubles. Thielavia root rot and the mosaic are both equally serious on outdoor sweet peas, as they are on indoor plants. It is not therefore necessary to repeat what was already stated before.

Beside the diseases already mentioned under greenhouse troubles, there are three other important drawbacks to outdoor sweet peas. These are: the Green Aphis, Anthracnose, and Streak.

The Sweet Pea Aphis, *Macrosiphum pisi* Kalt.

Of all the insect pests not one rivals, perhaps, in economic importance the green aphis. This pest also attacks the garden pea, the red and crimson clovers, as well as vetches. The lice are often seen in clusters attacking practically all parts of the plant except the roots. They derive their food by sucking the plant juices. The pest is very prolific. It is estimated that each individual aphis, if allowed full sway, would be the progenitor of 423,912 aphids in one season. Fortunately, weather conditions as well as natural enemies help to keep it in check. Cool wet seasons are not very favorable to this pest.

Lady beetles are our greatest friends, as they feed on these plant lice. Unfortunately, many florists and gardeners have not as yet learned this fact. Believing the lady beetles to be their enemy, some florists do everything possible to destroy them. The writer knows of a breeder of sweet peas, who as he said "experimented for ten years to find out means of eradicating the lady beetles."

Of still greater importance in the control of the sweet pea aphis is a little fly scientifically known as *Aphidius testaceipes*. The adult female of this fly possesses a long sharp-pointed ovipositor which is used to pierce the body wall of the louse and of depositing its eggs within the aphis. The egg upon hatching in the body of its host, gives birth to a small legless larva which begins at once to feed upon the interior organs of the louse, the latter of which soon dies and remains attached to the part of the plant upon which it was feeding. After a time, the larva pupates and then cuts out a circular hole on the top of the mummied body of the aphis, emerging as a winged fly. The two sexes mate, and the female is again ready to deposit her eggs in the bodies of other living lice.

Besides the lady beetles and Aphidius flies, there is also a fungus, *Empusa aphidis*, which parasitizes the sweet pea louse. It may be possible to cultivate the fungus and use it to inoculate broadcast the aphids.

The sweet pea aphis is not only a pest by itself in that it sucks the plant juices, but it also acts as a carrier and transmitter of the pathogen which causes mosaic. The sweet pea aphis is not only an outdoor pest but it often causes great damage to greenhouse peas. If we are to succeed at all in controlling many of the diseases previously mentioned, it is essential that we keep in check the sweet pea aphis.

Anthracnose, *Glomerella rufomaculans* (B.) V. Sch. and Sp.

The symptoms of a disease known as Anthracnose are diverse. Sometimes it is manifested in a wilting or dying of the tips, which become whitish and brittle and readily break off. At other times the dying works downwards and involves the entire branch. Frequently also, such infected leaves become brittle and soon drop. Examination of an infected leaf with a hand lens shows that it is peppered with minute salmon-colored pustules. At the time of blossoming the fungus makes its attack on the peduncle at the point of union with the buds, in this case, producing bud-drop, the bud hangs wiltingly from the peduncle, or the fungus attacks both the flower bud and the peduncle, in which case both dry up but do not

fall off. The most easily distinguishable symptoms of this disease are on the seed pods. Infected pods lose their green color, become shriveled, and are soon covered with salmon-colored patches which cannot fail to attract attention. The cause of the anthracnose is the fungus *Glomerella rufomaculans*. This fungus causes also the bitter rot of apple and the ripe rot of grapes. Cross inoculations have definitely proven that the fungus can go back and forth from the apple to the sweet pea and *vice versa*. Anthracnose begins its destructive work early, even in the seedling stage, this sometimes being the case in greenhouse conditions. In field conditions the disease starts about July 1, when the plants are in their bloom and in the prime of beauty. This is also the time when the bitter rot disease of the apple makes its appearance in the orchard. The fungus is carried over winter on cankered limbs and mummied fruits of diseased pods and seeds of the sweet pea and also in the soil. Anthracnose is a field disease which thrives in practically every season. It is favored as much by wet summers as by hot dry months with abundance of dew at night.

Streak, *Bacillus lathyri* Manns and Taub.

The cause of streak is an organism scientifically known as *Bacillus lathyri* Manns and Taub. Next to anthracnose, streak is a very serious disease, which cannot be taken too lightly. Until recently it was thought that streak was confined to outdoor sweet peas. Recently, however, the writer has found this to be a serious disease of the greenhouse peas.

The disease was first observed, according to a letter from Mr. T. A. Weston, of Orpington, England, by H. J. R. Digges, of Dublin, in 1904 or 1905. In the fall of 1906 Mr. Weston states he had a note of the disease in the Gardener's Chronicle, describing it as a "new disease under the title of 'Streak.'" In 1908 George Massee, in a letter to a correspondent who had sent in diseased specimens, replied, "the disease is of a physiological nature."

So far as we have been able to obtain literature, it appears that only since the summer of 1908 has any definite work been done upon the disease. Chittenden, in England during 1908, 1909,

1910, carried out inoculation work with the supposed parasite, viz., *Thielavia basicola*, obtaining during the first two seasons negative results. In this work Chittenden gives a good description of the disease. He found in 1910 that by excessive watering he was able to get infections from Thielavia, but he does not indicate they were the typical "streak." He writes in conclusion, "To sum up, as far as our experiments go, the 'streak' disease is brought about by the attack of the fungus *Thielavia basicola* on plants that have received some check at the root."

Symptoms of the Disease. Like the Bacteriosis of beans, streak makes its appearance in the season of heavy dew. On the sweet pea the disease usually appears just as the plants begin to blossom; it is manifested by light reddish-brown to dark brown spots and streaks (the older almost purple) along the stems, having their origin usually near the ground, indicating distribution by spattering rain and infection through the stomata. The disease becomes quickly distributed over the more mature stems until the cambium and deeper tissues are destroyed in continuous areas, when the plant prematurely dies. Occasionally petioles and leaves show infection; the latter show the usual water-soaked spots common to the bacterial leaf blight of beans.

The disease is not a vascular infection; it confines its attack to the mesophyll, the cambium and deeper parenchymous tissues. The lesions on the stems gradually enlarge and deepen till they come together.

The disease is severe on Soy beans, in which the lower lesions girdle the stem and penetrate so deeply that the plants blow over, as is occasionally to be met with in the "black leg" of potatoes (a bacterial disease).

In young clover in August and September it is particularly injurious, vying with Bains' Anthracnose (*Colletotrichum trifolii* Bain) and the clover root borer in its activity. In clover of all ages, probably the most severe attack takes place in the petiole at its union with the stem; in which case the entire leaf dies and the lesion extends down into the stem. The blackening of the stems and the spotting and water-soaking of areas on the leaves are common with the clovers.

Seeds as Carriers of Disease.

Investigations by the writer have definitely proved that anthracnose, *Glomerella rufomaculans*, may be directly carried with the seed. It is also very probable that "streak" too is transmitted in a similar way. Seeds are also carriers of spores of numerous saphrophytic fungi, which are unable to produce disease on living plants, but capable of rotting the seed when they lay too long in moist soil while germinating. To overcome this difficulty, the seed should be soaked in a solution of 5 parts of formaldehyde in 95 of water, from two to five minutes. This treatment will also kill spores of anthracnose which may adhere to the surface of the seed coat. The treatment will not reach the interior of infected seed. These should be carefully picked out and burned.

In storehouses, sweet pea seeds are often ruined by a little insect known as the "drug-store beetle." This pest, however, may be easily kept in check by fumigation with bisulphide of carbon, used at the rate of one pound of the chemical to each 1,000 cubic feet of space.

Methods of Control.

Steam sterilization in the greenhouse is the best means of making a soil safe for sweet peas. Much has already been said and written on how to steam sterilize a soil and the advantages derived from it. Prospective growers will do well to install a heating plant with facilities to generate steam. The establishment of such a plant will more than pay for itself as it will put on a sound basis the safe and profitable growing of all greenhouse crops.

Where steam facilities are lacking, the formaldehyde treatment is the next best means of soil sterilization. Dissolve one pint of pure formaldehyde (sold as 40% pure in all drug stores) in 20 gallons of water. With a watering can apply one gallon of the solution to every square foot of bed space. This soil treatment is usually done a week to ten days before planting.

To control mildew, spray with a solution of potassium sulphide, also known as liver of sulphur, one ounce in three gallons of water.

Some growers merely coat the pipes with a paste made of flowers of sulphur which seems equally effective in controlling mildew. Where fumigation is done it should be attended to carefully. Cool nights or early in the morning is the time to fumigate.

There is, as yet, no remedy known to control the "streak" disease, nor was there sufficient work done with fungicides to prove that anthracnose might be controlled by spraying. Bordeaux mixture may be valuable if the spraying is started early, when the seedlings are from two to three weeks old. If the disease has been allowed to gain a foothold, spraying will then be of little value.

Since "streak" is also a disease which attacks clovers as well as many other legumes, it is essential to keep these hosts away from our sweet pea plantations.

More Knowledge Necessary.

The subject of the diseases of the sweet pea has only been touched upon by the writer. The investigations on sweet pea diseases, carried on by the writer, were largely made possible through the support of some private sweet pea enthusiasts, the late Mr. W. A. Burpee being one of them. More investigations are necessary in order to fully work out practical and efficient means of control. Both the American Sweet Pea Society, as well as the Massachusetts Horticultural Society can do much towards this end. A fellowship might be established in some reputable college, or some state aid may be evoked to carry further the investigations of this important subject.

TRANSACTIONS

OF THE

Massachusetts Horticultural Society

FOR THE YEAR 1916

PART II

BOSTON
PRINTED FOR THE SOCIETY
NINETEEN HUNDRED AND SEVENTEEN

Massachusetts Horticultural Society.

1916.

The Transactions of the Society are issued annually in two parts under the direction of the Committee on Lectures and Publications.

Communications relating to the objects of the Society, its publications, exhibitions, and membership, may be addressed to William P. Rich, Secretary, Horticultural Hall, No. 300 Massachusetts Avenue, Boston, Massachusetts.

Committee on Lectures and Publications.

Wilfrid Wheeler, *Chairman*
John K. M. L. Farquhar
Prof. F. C. Sears
Fred A. Wilson

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TRANSACTIONS

OF THE

Massachusetts Horticultural Society.

1916, PART II.

REPORT OF THE BOARD OF TRUSTEES FOR THE YEAR 1916.

The Board of Trustees of the Massachusetts Horticultural Society presents herewith to the members a summary of the business transacted at its meetings during the year 1916.

January 8. Walter Hunnewell was elected Treasurer of the Society for the year 1916, William P. Rich was elected Secretary, Librarian, and Superintendent of the Building, and James Wheeler Superintendent of Exhibitions for the year.

It was voted to appropriate for the library $400.00 in addition to the income of the French and Farlow Funds and the unexpended balance of the library appropriation of the previous year, and $400.00 for the Committee on Gardens.

The office of Vice-President being vacant, on account of the election of Mr. Saltonstall as President, Nathaniel T. Kidder was elected to fill that position for the remainder of the year.

A communication from Charles F. Fairbanks was presented suggesting the holding of a joint exhibition with the American Gladiolus Society in August next. It was voted to refer the matter to the Committee on Prizes and Exhibitions and the sum of $400.00 for prizes was authorized, the amount to be included in the regular appropriation for the year.

Mr. Wheeler called attention to the convention of the American Pomological Society in 1917 and suggested that an invitation be extended to that Society to hold its meeting in connection with the fall fruit show of the Massachusetts Horticultural Society. It was voted that such an invitation be extended.

February 5. The special committee on rental of the halls of the Society's Building reported that no change of rates was advisable. In regard to granting the use of the halls to allied organizations and others at a reduced charge the committee recommended that in such cases the application be referred for approval to a member of the committee and the Superintendent of the Building. The report of the committee was accepted and its recommendations adopted.

A communication from Mr. George Robert White was presented in which he desired to increase the amount of the George Robert White Medal of Honor Fund by $1500.00 in order to provide for any future possible falling off of income, increase in cost, renewal of dies, etc. On motion of Mr. Saltonstall it was voted to accept the gift of Mr. White of the additional sum of $1500.00 and that the Society hold the same in trust as stated in the original deed of trust under date of December 10, 1910.

The matter of the appropriation for prizes and gratuities for the year 1917 was presented and on motion of Mr. Farquhar it was voted that a sum not exceeding $6000.00, in addition to the income of the special prize funds of the Society, be appropriated for prizes and gratuities for the year 1917.

June 16. A communication from Messrs. Zandbergen Bros. of Holland was presented offering a prize at the Spring Exhibition of 1917 of twenty dollars for the best collection of bulbs grown by a private gardener. It was voted to accept the offer subject to the usual rules governing such prizes.

An appropriation not exceeding $500.00, to include the income of the John Lewis Russell Fund, was voted for the winter course of lectures in January, February, and March, 1917.

Mr. Allen sent a report in writing concerning the change of color of the brick walls of the large exhibition hall in which he stated

that the work had been successfully carried out and was very generally approved. On motion of Mr. Estabrook it was voted that the thanks of the Society be extended to Mr. Allen for the successful decoration of the hall.

The proposed outdoor exhibition in June was considered and Prof. Sargent suggested that the matter be referred to the Advisory Committee with power. On motion of Mr. Estabrook it was voted that such an exhibition be held in some suitable place in Boston provided a sufficient guarantee fund be secured to protect the Society from possible loss. It was further voted, on motion of General Weld, that all details connected with the proposed outdoor exhibition in June, 1917, including the selection of a proper site, the securing of a sufficient guarantee fund, and all other matters incident thereto be referred to the Advisory Committee with full authority.

It was voted, on motion of Prof. Sargent, that the Committee on Fruits, in conjunction with the Committee on Prizes and Exhibitions, be requested to take up and consider the advisability of holding a special fruit show in the fall of 1917, to prepare a suitable schedule, and submit it to the Board at its next meeting.

October 16. President Saltonstall called attention to the matter of the large amount of insurance carried on the Society's Building and suggested that in view of its solid and fireproof construction the amount of insurance might well be reduced. He presented several reports from experts in this line favoring such reduction.

After a general discussion of the subject it was finally voted, that the full amount of insurance be carried for the next term.

Regarding the insurance on the library it was voted that it be insured for such a sum as the Library Committee thinks wise.

The following motion was adopted:

Voted: — That the bequest of Miss Helen Collamore to the Society of $5000.00 and accumulated interest amounting to $50.00 — total $5050.00 — be accepted and that the Treasurer be asked to hold the same as part of the permanent funds of the Society, the income thereof to be used from year to year as the Trustees may determine.

Appropriations were voted as follow:

For the Children's Garden Exhibition, $350.00 to include the State appropriation of $200.00, and Mr. Wilder and the Secretary were appointed a committee to secure additional prizes for this exhibition.

For the Committee on Gardens a sum not exceeding $200.00.

Mr. Wilder called attention to the reduction in the amount of prizes offered for fruits during the last few years. He said that the fruit interest was an important department of the Society's work and should receive suitable encouragement. On motion of Mr. Wheeler it was voted to recommend to the Advisory Committee that the sum of $1400.00 be appropriated for fruits in the Schedule of the ensuing year.

The special committee on nominations for the various committees of the Society for the year 1917 submitted the following list which was adopted:

Massachusetts Horticultural Society.

Nominations for 1917 Committees.

Finance: — Walter Hunnewell, Chairman, Arthur F. Estabrook, Stephen M. Weld.

Membership: — Thomas Allen, George E. Barnard, Richard M. Saltonstall.

Prizes and Exhibitions: — James Wheeler, Chairman, John K. M. L. Farquhar, Duncan Finlayson, Thomas Roland.

Plants and Flowers: — William Anderson, Chairman, Arthur H. Fewkes, S. J. Goddard, Arthur E. Griffin, Donald McKenzie.

Fruits: — Edward B. Wilder, Chairman, Wm. N. Craig, Isaac H. Locke, James Methven.

Vegetables: — John L. Smith, Chairman, Edward Parker, Wm. C. Rust.

Gardens: — Richard M. Saltonstall, Chairman, John S. Ames, David R. Craig, William Nicholson, Charles Sander, Charles H. Tenney.

Library: — Charles S. Sargent, Chairman, Ernest B. Dane, Nathaniel T. Kidder.

Lectures and Publications: — Fred A. Wilson, Chairman, Leonard Barron, Nathaniel T. Kidder.

Children's Gardens: — Henry S. Adams, Chairman, Dr. Harris Kennedy, Mrs. W. Rodman Peabody, Miss Margaret A. Rand, James Wheeler.

December 4. It was voted to invite the American Sweet Pea Society to hold its annual meeting and exhibition in Horticultural Hall, Boston, on July 7, 1917, in conjunction with the Sweet Pea Exhibition of the Massachusetts Horticultural Society; and it was further voted to extend an invitation to the American Carnation Society to hold its annual convention and exhibition in the halls of the Society in January, 1918.

A communication from Mr. E. K. Butler was presented offering forty dollars in prizes for exhibits of roses at the Rose Exhibition of the Society in June, 1917. It was voted to accept with thanks the offer of Mr. Butler and to incorporate the prizes in the Schedule of the year.

It was voted also to accept the offer of Mr. Wm. B. H. Dowse of a silver vase to be awarded to the exhibitor making the best showing of vegetables at the exhibitions of the Society during the year 1917.

The Committee on the Library reported through its Chairman, Prof. Sargent, on the subject of safeguarding the library and particularly the accession books and catalogues. The committee suggested the installation of several metal doors and window shutters. The matter was referred to the Advisory Committee with authority to take such action as may be deemed necessary. In the meantime the Secretary was authorized to hire a suitable box in the vaults of the Massachusetts Trust Company.

The special committee on the award of the George Robert White Medal of Honor for the year 1916 reported the name of William Robinson of England in recognition of his distinguished services in the advancement of the interest in horticulture. On motion of Prof. Sargent it was voted unanimously to award the medal to Mr. Robinson.

Mr. Allen reported further progress in the details of the outdoor exhibition of June next. He showed plans of the general arrangement of the various exhibits which were approved by the Board.

In this connection it was voted, on motion of Mr. Estabrook, to authorize the Treasurer to advance from time to time from the funds of the Society such amounts of money as may be required in the installation of this exhibition with the understanding that the Society shall be reimbursed for such expenditure from the receipts of the exhibition or from the subscribers to the guarantee fund.

William P. Rich,
Secretary.

REPORT OF THE COMMITTEE ON PRIZES AND EXHIBITIONS FOR THE YEAR 1916.

By James Wheeler, Chairman.

The Committee on Prizes and Exhibitions has held numerous meetings during the year preparing the Schedule of prizes for the year 1917 and arranging the exhibitions of 1916.

The free exhibitions of the year have been good and well attended but the pay shows do not have the support that the Society merits. The large private estates do not make special efforts to bring in large specimens of plants nor to exhibit new and rare varieties as they formerly did.

The commercial growers have come forward and supported the Society generously, and while they cannot give the time to grow special large plants, flowers, fruits, and vegetables they bring in the best they have and assist greatly in making the exhibitions of today.

The receipts of the pay shows may have been as good as the shows merit.

By direction of the Advisory Committee we have arranged a large Spring Exhibition in March, 1917, and a Special Fruit Show in October, omitting some of the smaller exhibitions and the usual Autumn Show.

The committee earnestly requests a larger coöperation of the owners of large estates and their gardeners in taking greater interest in the exhibitions of the Society.

The Schedule of Prizes and Exhibitions for the year 1917 has been approved by the Board of Trustees and published.

It is earnestly hoped that all the members of the Society will coöperate in making the coming year a notable one in the history of the Society.

James Wheeler
John K. M. L. Farquhar
Duncan Finlayson
T. D. Hatfield
A. H. Wingett

Committee on Prizes and Exhibitions.

REPORT OF THE COMMITTEE ON PLANTS AND FLOWERS FOR THE YEAR 1916.

By William Anderson, Chairman.

The Spring Exhibition, which opened on March 17th and continued for three days, was equal in quantity and quality of plants and flowers shown to any held in recent years.

Noteworthy among the exhibits we would first mention the spacious garden arranged by R. and J. Farquhar and Co. which occupied one end of the main exhibition hall. Excellent taste was shown in placing the masses of Rhododendron Mrs. Wagner, *R. Kaempferi,* and while Lilacs. There were also many excellent plants of Wistaria, Laburnum, and the new Chinese *Lilium regale.* The bulb flower exhibit from Weld Garden, Duncan Finlayson, superintendent, was notable for its quantity, great variety, and tasteful arrangement. Equally noteworthy were the fine Narcissi and Tulips shown by A. W. Preston, J. L. Smith, gardener, in different classes.

W. W. Edgar Co. exhibited a fine specimen of *Acacia heterophylla;* this firm was first with a group of foliage and flowering plants. Fine Cyclamen, Cineraries, Lilies, and Primulas were shown. Eric H. Wetterlow, gardener to Mrs. Lester Leland, was awarded the special prize offered for the best ten Cyclamen. E. B. Dane was first in cut orchids; the same exhibitor was awarded a First Class Certificate for a plant of *Sophro-Cattleya Thwaitesii;* also a fine plant of *Odontioda Bradshawiae* bearing a spike of sixty-five blooms was awarded a Silver Medal.

Walter Hunnewell, T. D. Hatfield, gardener, exhibited a nice lot of *Dendrobium nobile* and its varieties for which he was awarded a Cultural Certificate. Thomas Watt exhibited fine blooms of Moutan Peonies. Honorable Mention was awarded to S. J. Goddard for Carnation Doris, to W. R. Nicholson for seedling Carnation, and to F. Dorner and Son for a vase of seedling Carna-

tions. F. Lemon of Richmond, Indiana, was awarded a Certificate of Merit for *Primula malacoides rosea,* a dwarf free flowering form of *Primula malacoides.* Mrs. C. G. Weld, W. C. Rust, gardener, exhibited a nice group of orchids notable among which were some well-flowered plants of *Dendrobium Wardianum;* the same exhibitor was awarded a Certificate of Merit for Antirrhinum Weld Pink. William Sim exhibited Sweet Peas of excellent quality.

May Exhibition, May 10–14.

The May Exhibition, which opened May 10, did not come up to expectations, due principally to the backward season which ruled out some of the most important exhibits. In many of the classes there were no entries at all and in many others no competition.

Among the best exhibits was the very interesting and valuable collection of Conifers shown by the Blue Hill Nurseries, South Braintree, Mass. This collection included varieties of Abies, Pines, Piceas, Thuyas, and Taxus; all known to be hardy in Massachusetts. A Silver Medal was awarded. Duncan Finlayson exhibited a remarkable and valuable collection of dwarfed Japanese plants for which he obtained first prize and a Silver Medal. F. R. Pierson and Co. of Tarrytown, N. Y., showed a most tastefully arranged group of roses covering one hundred square feet.

Another exhibit that showed fine taste and ability in arrangement was that of Penn the Florist. His exhibit was made up of floral baskets and vases in which *Iris hispanica,* Antirrhinums, Marguerites, and orchids were most effectively arranged. A. M. Davenport was first and the W. W. Edgar Co. of Waverley second for a group of flowering and foliage plants. F. J. Dolansky of Lynn was the only exhibitor in the class calling for a group of orchids covering two hundred square feet.

Thomas Roland exhibited a group of *Bougainvillea Sandcriana* for which he was awarded a Silver Medal. Other excellent plant exhibits were the *Calceolaria Stewartii* shown by Winthrop Ames, and Pelargoniums by Mrs. C. G. Weld. Walter Hunnewell was

the principal exhibitor of Hybrid Rhododendrons. He also exhibited a group of *Rhododendron sinense*, a pale yellow variety raised from seeds collected in China for which he was awarded a Silver Medal.

Charles Sander, gardener at Holm Lea, was awarded a Gold Medal for a fine display of seedling Azaleas, twenty-five varieties, the result of crosses between *A. Hinodigiri*, Garnot, and Romantaie. The same exhibitor also had on exhibition a seedling Rhododendron, the result of a cross between *R. Smirnowi* and a garden variety. In vases of fifty roses, Hadley, Mrs. Bayard Thayer, and Mrs. Aaron Ward were the winners in their respective colors.

In the Rose classes for private gardeners W. C. Rust exhibited splendid vases of Hoosier Beauty, Mrs. Charles Russell, and Lady Hillingdon. The Albert Roper Estate was awarded a Silver Medal for a fine cerise pink Carnation, Albert Roper. S. J. Goddard exhibited Carnation Doris and was awarded a Certificate of Merit. A. W. Preston, J. L. Smith, gardener, exhibited a plant of *Brasso-Cattleya Maroniae* (*Cattleya gigas* × *Brasso-Cattleya Digbyana*) for which he was awarded a Silver Medal. F. W. Fletcher & Co. exhibited a light blue Delphinium, Clivedon Beauty, and received Honorable Mention.

Exhibition, May 27.

Miss Grace Sturtevant, Wellesley Farms, exhibited a collection of Iris, the best of which were: Regeliocyclus, a dwarf and interesting variety, Mrs. Alan Grey, and Trojana, and a vase of Sappho seedlings. The collection was awarded Honorable Mention. Mr. Bayard Thayer, William Anderson, superintendent, was awarded a Silver Medal for *Lilium Willmottiae*, a new lily from China and shown for the first time. This lily grows from three to four feet in height with wiry stems clothed with narrow, oblong leaves; the flowers are apricot-yellow spotted with brown, three inches or more across and strongly recurved. It is perfectly hardy and flowers outside in late June and early July. Oliver Ames, Edward Parker, gardener, exhibited a nice lot of Darwin Tulips for which he was awarded Honorable Mention.

Exhibition, June 10.

June 10th was the date of the Peony Show, but on account of the lateness of the season the show was postponed one week. However, on the 10th Miss Grace Sturtevant exhibited twenty-one seedling Irises, all of the Germanica and Pallida type. The awards were as follow:

Iris Merlin (Oriflamme × Iris King) awarded a Certificate of Merit; standards light bronze-purple; falls deep reddish purple, large and broad; growth vigorous, about three feet.

Iris Mme. Cheri (Caterina × Mrs. G. Darwin) awarded Certificate of Merit; standards rosy bronze; falls blue, tinted bronze; growth vigorous, about three feet.

Iris Niverna (Cypriana × Mrs. G. Darwin) awarded Honorable Mention; standards, bronze, tinted with purple; falls light blue, throat veined with yellow.

Iris Empire (Monsignor × Aurea) awarded Honorable Mention; standards yellow, tinged with bronze; falls bronze-yellow, tinged with purple.

Iris Hope (parentage not given) awarded Honorable Mention; standards light rosy lavender; falls lavender, with deeper lavender veins.

Peony Exhibition, June 17 and 18.

This usually fine show, after having been postponed one week on account of the backward season, still came a week too early for Peonies in the vicinity of Boston. The result was that few local Peonies were shown. However, fine displays of Iris, Hemerocallis, Oriental Poppies, and other herbaceous flowers helped to make a nice exhibition.

G. H. Peterson of Fair Lawn, New Jersey, was first in most of the Peony classes. Other prize winners were Mrs. J. L. Gardner, A. H. Fewkes, S. G. Harris, G. N. Smith, and Mrs. C. S. Minot. The Wellesley Nurseries had a fine collection, not for competition. There were no first-class single varieties shown. The following is a

list of the best double varieties shown: Felix Crousse, Mme. de Galhau, Triomphe de l'Exposition de Lille, Baroness Schroeder, Reine Hortense, Jeanne d'Arc, Eugene Verdier, Comte de Gonia, Mme. Emile Galle, Avalanche, Mme. Jules Dessert, Sarah Bernhardt, Stephania, Alfred de Musset, Pink Beauty, and Asa Gray.

Miss Grace Sturtevant had a notable exhibit of seedling Iris of the Germanica type. Thirty varieties were shown. The following is a description of the best varieties and the awards made:

Iris Avalon (Queen of May × Caterina) awarded Silver Medal; self colored lilac blooms of fine substance; falls flare and standards overlap; beard, silvery white; stems, strong, about four feet in height.

Iris Stanley H. White (Hector × Caterina) awarded Certificate of Merit; flower is rich yellow except for the fine yellow lines in the falls, the top has a rounded effect due to the ruffled standards overlapping.

Iris Ann Leslie (Dr. Bernice seedling) awarded Honorable Mention; a strong growing variety with flowers of a very unusual color, falls velvety carmine, standards white, tinted rose towards the top, stems three feet in height.

E. B. Dane had a nice exhibit of orchid blooms including the following: *Vanda suavis, Dendrobium clavatum, Odontioda Charlesworthii, Sobralia xantholeuca, Cypripedium Maudiae, Cypripedium Lawrenceanum Hycanum, Miltonia vexillaria, Cattleya gigas,* and a fine variety of *Oncidium crispum.* J. T. Butterworth also exhibited cut blooms of *Dendrobium Jamesianum, Odontoglossum crispum,* and Miltonias.

R. and J. Farquhar and Co. received a Silver Medal for an extensive display of herbaceous plants and shrubs. The Blue Hill Nurseries exhibited a collection of nine varieties of Hemerocallis the finest of which was the pure bright orange Dr. Regal. The Mount Desert Nurseries of Bar Harbor had a novel and artistic display of Eremurus, Iris, Dicentra, Solomon's Seal, Lilacs, Hemerocallis, and other hardy flowers; each variety arranged by itself in a branching bamboo stand.

Rose and Strawberry Exhibition, July 1 and 2.

On account of the lateness of the season this show had to be postponed one week and even then it did not seem to suit the local growers. However, the hall was well filled.

Conspicuous among the Rose exhibits was the fine table of Climbing Roses shown by A. J. Fish of New Bedford; the most striking varieties being Silver Moon, Dr. Van Fleet, Climbing American Beauty, and Baroness Ittersum. A Silver Medal was awarded this exhibit.

In the competitive classes the leading prize winners were Thomas N. Cook, Robert Seaver, A. W. Preston, W. C. Winter, and George E. Barnard. In the Hybrid Perpetual classes the old varieties held their own. The Hybrid Tea Roses shown attracted much attention, a few of the finest were Duke of Westminster, Mme. Melane Soupert, Mme. Caroline Testout, Mabel Drew, The Lyon, J. B. Clark, Mme. Paul Eulor, Dean Hole, Otto von Bismarck.

There were good Peony collections from T. C. Thurlow's Sons Co. and A. H. Fewkes. R. and J. Farquhar and Co. and The Blue Hill Nurseries had fine displays of herbaceous flowers well arranged. E. B. Dane and J. T. Butterworth exhibited nice tables of cut orchids. Duncan Finlayson was awarded a Certificate of Merit for a plant of the pure white *Coelogyne Mooreana*.

Sweet Pea Exhibition, July 8 and 9.

The Sweet Pea Show was a good one, the exhibits being of high quality, and the large hall was well filled. The dates seemed a little too early for growers in the vicinity of Boston, however, so the principal prize winners were from Lenox. Edwin Jenkins and S. W. Carlquist had very fine exhibits. The following is a list of the best varieties in their respective colors:

Constance Hinton, White; Sunproof Crimson, Crimson; Mrs. Dameron, Yellow; Rosabelle, Carmine; Blue Monarch, Blue; Lady Evelyn Eyre, Blush; Hercules, Deep Pink; Mrs. H. Dickson,

Cream Pink; Mary Unwin, Orange; Orchid, Lavender; Royal Purple, Purple; John Ridd, Maroon; Jean Ireland, Picotee Edged; Jessie Cuthbertson, Striped Red.

S. W. Carlquist was awarded a Silver Medal for a display of Sweet Peas which included many of the newest varieties. Wild flowers were an interesting feature of the show, Albert Davidson of Melrose taking first with 114 varieties. Mrs. Homer Gage of Shrewsbury was the only exhibitor of Japanese Iris and A. W. Preston put up a nice exhibit of Tea and Hybrid Tea Roses.

Special Exhibition, July 15.

Dr. and Mrs. Homer Gage of Shrewsbury and Dr. and Mrs. Harris Kennedy of Milton exhibited Japanese Iris. The Homer Gage collection contained thirty varieties and was awarded a Silver Medal. The Eastern Nurseries had on exhibition 14 varieties of hardy Spiraea. R. and J. Farquhar and Co. put up a large group of *Lilium regale* for which they were awarded Honorable Mention.

Gladiolus Exhibition.

The Gladiolus Exhibition opened on August 11 and continued for three days. The American Gladiolus Society also held its annual exhibition under the auspices of this Society on the same date. It was decidedly the largest and best exhibition of Gladiolus ever seen in Boston. There were many new varieties and some of these were remarkable for their color, size, and texture. The Primulinus hybrids were noteworthy for their wonderful color and gracefulness and were undoubtedly the most admired flowers on exhibition. The principal exhibitors were C. F. Fairbanks of Milton, L. Merton Gage, and Thomas Coggar; also T. A. Havemeyer and John Lewis Childs of New York. Among the many fine varieties on exhibition were Julie M. Fairbanks, Muriel, Daisy Rand, Goliath, Schwaben, Miss Cavell, Mrs. Watt, White Ivory, Evelyn Kirtland, Mme. Mounet-Sully, Mrs. F. Pendleton. In the non-competitive displays C. F. Fairbanks was awarded a Gold

Medal for a large and artistic group, also for his work in the advancement and culture of the Gladiolus. S. E. Spencer of the Brooklands Gardens also had a large group of splendid flowers.

In other classes the Blue Hill Nurseries took first for best collection of herbaceous Phlox and Weld Garden was first with fine Tuberous Begonias.

On August 26, L. Merton Gage of Natick, Mass., was awarded a Silver Medal for Gladiolus Mrs. Dr. Norton, a very beautiful seedling of the Gandavensis type. The flowers were very large, well set on a tall spike, white in color, suffused at the edges with soft pink, the three lower petals blotched with sulphur yellow.

Dahlia Exhibition, September 9 and 10.

On account of the lateness of the season the show was not as extensive as usual, but the quality of the flowers shown was extra good. The outstanding feature of the show was the three large vases of the new rose pink Peony-flowered Dahlia, Mrs. Frederick Grinnell, exhibited by John P. Rooney of New Bedford, Mass., which was awarded a Silver Medal. E. W. Bennett received a Certificate of Merit for Dahlia Meritorious, a very large flower of the Decorative type. Fottler, Fiske and Rawson Co. was awarded a Silver Medal for an extensive and well-arranged display of Dahlias and Gladioli.

Others who had fine Dahlia displays were Mrs. L. A. Towle, George L. Stillman, J. K. Alexander, and W. D. Hathaway. For the largest and best collection of all classes J. K. Alexander was first. W. N. Craig was first for 30 vases of herbaceous flowers and there were also extensive collections of wild flowers.

The Autumn Exhibition.

The Autumn Exhibition which opened on November 1 was good, although there was a lack of competition in many of the classes. There were no orchids entered for competition except in the class for a single specimen. With the exception of the large plant of

Garza exhibited by Galen L. Stone the trained Chrysanthemum plants were very ordinary. The plant groups were good, especially that of 150 square feet limited to private gardeners in which William Thatcher, gardener to Mrs. John L. Gardner, displayed excellent taste in a gracefully arranged group in which Chrysanthemums, Liliums, and Nerine Fothergillii predominated. A. M. Davenport was first with a group of flowering and foliage plants, covering 300 square feet, in which Begonia Mrs. Heal and Chrysanthemums were effectively arranged. Close massing of the plants in the larger groups was the rule and this did not add to their effectiveness.

Begonias were largely shown and were of good quality, far surpassing the Chrysanthemums in attractiveness. E. H. Wetterlow, gardener to Mrs. Lester Leland, was first with six specimens of Gloire de Lorraine. For six plants of any other color E. S. Webster was first with six magnificent plants of Begonia Optima, one of which was also awarded a Silver Medal. Mrs. C. G. Weld, William C. Rust, gardener, was awarded a Silver Medal for a collection of winter flowering Begonias which included the following: Optima, Apricot, Elaitor, Winter Cheer, and Mrs. Heal. Thomas Roland exhibited a splendid lot of highly colored Crotons and plants of early flowering Camellias.

Caplan the Florist was the only exhibitor in the class for a display showing the various ways flowers can be used for home decoration. His display consisted of neatly arranged baskets and vases of cut flowers.

The cut flowers of Chrysanthemums were very fine. The principal exhibitors and prize winners were Galen L. Stone, W. H. Wellington, James Nicol, W. W. Edgar Co., Mrs. Lester Leland, and R. E. Traiser.

Splendid Carnations were exhibited by A. A. Pembroke, J. W. Minott, and Charles S. Strout. The best varieties of these were Rosette, Pocahontas, Champion, Pink Delight, Mrs. C. W. Ward, and Matchless. A. A. Pembroke was awarded Honorable Mention for a sport of Benora, a good variety, a shade darker than Benora. Charles S. Strout of Biddeford, Maine, received Honorable Mention for seedling crimson Carnation No. 9.

Chas. E. Holbrow was awarded Honorable Mention for a Rose

seedling, a cross between Christie Miller and Richmond. A. W. Preston was awarded a First Class Certificate for *Cattleya Fabia alba* and a Silver Medal for Cattleya Lord Rothschild alba. The Waban Rose Conservatories sent in splendid vases of Mrs. Charles Russell and Hadley Roses.

November 25, Henry Stewart of Waltham was awarded a Silver Medal for superior cultivation of *Oncidium varicosum Rogersii,* a plant which carried over 300 flowers.

WILLIAM ANDERSON
ARTHUR H. FEWKES
S. J. GODDARD
DONALD MCKENZIE
WILLIAM SIM

Committee on Plants and Flowers.

PRIZES AND GRATUITIES AWARDED FOR PLANTS AND FLOWERS.

1916.

Spring Exhibition.

March 17, 18, and 19.

Theodore Lyman Fund, No. 2.

Acacia.— One specimen plant:
1st, W. W. Edgar Co., $10.
Cinerarias.— Grandiflora type, six plants:
1st, Miss Cornelia Warren, $12; 2d, Mrs. C. G. Weld, $6.
One specimen plant:
Mrs. C. G. Weld, $4.
Stellata type, six plants:
1st, Weld Garden, $12; 2d, Mrs. J. L. Gardner, $6.
One specimen plant:
Mrs. J. L. Gardner, $4.
Cyclamens.— Eight plants:
1st, Mrs. Lester Leland, $25; 2d, Mrs. J. L. Gardner, $12.
Six plants:
1st, Mrs. J. L. Gardner, $15; 2d, E. B. Dane, $8.
Cytisus.— Six plants:
1st, Miss Cornelia Warren, $15.
Ericas.— Six plants, in not less than three varieties:
1st, Miss Cornelia Warren, $15.
Freesias.— Six pots:
2d, Weld Garden, $4.
Hard-wooded Greenhouse Plants, other than Acacias and Ericas.— Six specimen plants:
1st, W. W. Edgar Co., $15; 2d, Weld Garden, $8.
Hyacinths.— Six pans not exceeding ten in.:
1st, Weld Garden, $10.
One pan not exceeding 10 inches.
1st, A. W. Preston, $4; 2d, A. W. Preston, $2.
Liliums.— Twelve pots, one or more varieties:
1st, W. W. Edgar Co., $15.
Lily of the Valley.— Six pots, not over eight in.:
1st, A. W. Preston, $6; 2d, Oliver Ames, $4.

Narcissi.— Large Trumpet, twelve pots:
1st, A. W. Preston, $15; 2d, Weld Garden, $8.
Large Trumpet, four pots:
1st, Weld Garden, $6.
Short Trumpet, twelve pots:
1st, A. W. Preston, $10; 2d, Weld Garden, $5.
Orchids.— Group of plants arranged for effect with ferns or other foliage plants, to cover not less than 50 sq. ft.:
1st, Mrs. C. G. Weld, $30.

Society's Prizes.

Palms.— Six plants in pots:
1st, Weld Garden, $20.
Schizanthus.— Six plants:
1st, Miss Cornelia Warren, $12; 2d, Weld Garden, $6.
Tulips.— Six pans not over ten in.:
1st, A. W. Preston, $12; 2d, Mrs. J. L. Gardner, $6.
Three pans, White:
1st, Mrs. J. L. Gardner, $6; 2d, A. W. Preston, $3.
Three pans, Red:
1st, Weld Garden, $6; 2d, Mrs. J. L. Gardner, $3.
Three pans, Pink:
1st, Mrs. J. L. Gardner, La Reve, $6; 2d, Weld Garden, Pink Beauty, $3.
Three pans, Yellow:
1st, Mrs. J. L. Gardner, Canary Bird, $6; 2d, A. W. Preston, Golden King, $3.
Three pans, any other color:
1st, Weld Garden, $6; 2d, Mrs. J. L. Gardner, $3.
General Display of Spring Bulbous Plants.— To be arranged with foliage plants:
1st, Weld Garden, $40; 2d, Mrs. J. L. Gardner, $20.
Artistic display of Foliage and Flowering Plants.— Not exceeding 250 sq. ft.:
1st, W. W. Edgar Co., $50; 2d, Mrs. C. G. Weld, $25.
Forced Hardy Shrubs.— To cover not more than 150 sq. ft.:
1st, Weld Garden, $25.

Amateur Classes.

Hyacinths.— Six plants, in one or more pots:
1st, Miss M. A. Rand, $5; 2d, Miss M. A. Rand, $3.
Narcissi.— Twelve plants in one or more pots:
1st, Miss M. A. Rand, Glory of Leiden, $5; 2d, Miss M. A. Rand, Sir Watkin, $3.

Collection of Forced Bulbs.— To cover not more than 12 sq. ft.:
1st, Miss M. A. Rand, $10; 2d, Miss M. A. Rand, $8.
Tulips.— Twelve plants in one or more pots:
1st, Miss M. A. Rand, Goldfinch, $5; 2d, Miss M. A. Rand, Prince of Austria, $3.

Special Prizes offered by the Gardeners' and Florists' Club of Boston.

Cyclamens.— Ten plants:
E. H. Wetterlow, $50.

Special Prizes offered by Charles F. Fairbanks.

Primulas.— Malacoides, eight plants:
1st, Mrs. C. G. Weld, $15; 2d, Miss Cornelia Warren, $10.
Obconica, eight plants:
1st, Mrs. J. L. Gardner, $15.
Tulips.— Darwin. Best display in pots: 1st, Weld Garden, $30.

John Allen French Fund.

Carnations.— Fifty blooms, White:
1st, A. A. Pembroke, $8; 2d, Strouts, $4.
Fifty blooms, Red:
1st, Strouts, Pocahontas, $8; 2d, S. J. Goddard, Beacon, $4.
Fifty blooms, Pink:
1st, A. A. Pembroke, Pink Sensation, $8; 2d, S. J. Goddard, Pink Sensation, $4.
Fifty blooms, Yellow:
1st, Mrs. E. K. Farr, Yellow Prince, $8; 2d, S. J. Goddard, Yellow Prince, $4.
Fifty blooms, Variegated:
1st, S. J. Goddard, Benora, $8; 2d, A. A. Pembroke, Benora, $4.
Orchids.— Cut flowers, arranged for effect, to cover 24 sq. ft.:
1st, E. B. Dane, $20.
Roses.— Twenty-five blooms, Red:
1st, Waban Rose Conservatories, Hadley, $12; 2d, Thomas Roland, Richmond, $6.
Twenty-five blooms, Pink:
1st, Waban Rose Conservatories, Killarney Queen, $12; 2d, Waban Rose Conservatories, Killarney Brilliant, $6.
Twenty-five blooms, any other color:
1st, Waban Rose Conservatories, Mrs. Bayard Thayer, $12.
Sweet Peas.— Twenty-five blooms, White:
1st, William Sim, White Orchid, $4.

Twenty-five blooms, Scarlet:
1st, William Sim, Zvolanek's Red, $4; 2d, William Sim, Zvolanek's Scarlet, $2.
Twenty-five blooms, Pink:
1st, William Sim, Mrs. Skach, $4; 2d, William Sim, Christmas Pink, $2.
Twenty-five blooms, Lavender:
1st, William Sim, Baur's Lavender, $4.
Twenty-five blooms, any other color:
1st, William Sim, Venus, $4; 2d, William Sim, Orange Orchid, $2.

Violets.— One hundred blooms, Single:
1st, Edward Bingham, Princess of Wales, $4; 2d, Esty Bros., Princess of Wales, $2.
One hundred blooms, Double:
1st, Edward Bingham, Lady Hume Campbell, $4; 2d, Oliver Ames, Lady Hume Campbell, $2.

Gratuities:

W. T. Walke, group of flowering and foliage plants, $20.
Mrs. J. L. Gardner, display of Cyclamens, $5.
E. B. Dane, " " " $4.
Weld Garden, " " " $4.
W. T. Walke, specimen Hydrangeas, $10.
Thomas Roland, display of *Erica melanthera*, $10.
Miss Cornelia Warren, specimen *Dendrobium nobile*, $2.
Mrs. J. L. Gardner, Calanthe William Murray, $3.
Boston Cut Flower Co., table decorations and display of plants, $12.
Houghton, Gorney Co., artistic display of cut flowers and plants, $10.
William Sim, collection of Sweet Peas, $5.
T. T. Watt, Tree Peonies, $1.
Osgood Bros., display of Pansy flowers, $2.
Mrs. C. G. Weld, vase of *Leptosyne maritima*, $1.
P. E. Richwagen, 3 vases seedling Antirrhinums, $5.
Mrs. E. K. Farr, vase of Carnation Harry Fenn, $2.
Caplan the Florist, table decoration and display of cut flowers, $8.
H. R. Comley, table decoration and display of Roses and Carnations, $8.

May Exhibition.

May 10, 11, 12, 13, and 14.

Antirrhinums.— Eight plants:
1st, Mrs. C. G. Weld, $12.

Azalea indica.— Group to cover not more than 200 sq. ft.:
1st, A. M. Davenport, $100.

Four plants:
1st, A. M. Davenport, $50; 2d, Miss Cornelia Warren, $25.

CALCEOLARIAS.— Large-flowering varieties, eight plants:
1st, Mrs. J. L. Gardner, $15; 2d, E. A. Clark, $8.
Stewartii, six plants:
1st, Winthrop Ames, $15; 2d, Miss Cornelia Warren, $8.

CAMPANULA MEDIUM.— Eight plants:
1st, Miss Cornelia Warren, $15.

ERICAS.— Six plants:
1st, Miss Cornelia Warren, $15.

TREE FERN.— One specimen:
1st, Weld Garden, $10; 2d, A. M. Davenport, $5.

FUCHSIAS.— Four plants:
1st, S. J. Goddard, $12.

HELIOTROPE.— Standard, six plants:
1st, Faulkner Farm, $15; 2d, W. W. Edgar Co., $8.

HYDRANGEAS.— Group to cover not less than 150 sq. ft.:
1st, W. W. Edgar Co., $75; 2d, E. A. Clark, $40.
Four plants, not less than two varieties:
1st, W. W. Edgar Co., $25; 2d, W. T. Walke, $12.

MARGUERITES.— Six plants:
1st, Faulkner Farm, $20; 2d, F. W. Fletcher & Co., $10.

ORCHIDS.— Group arranged for effect, covering 100 sq. ft.:
1st, F. J. Dolansky, $200 and Gold Medal.
Six plants, six varieties:
1st, J. T. Butterworth, $20.

PALMS.— Two Arecas:
1st, Weld Garden, $15.
Two Kentias:
1st, Weld Garden, $15; 2d, Mrs. J. L. Gardner, $8.
Two Phoenix Roebellini:
1st, Weld Garden, $15; 2d, Mrs. Lester Leland, $8.
Two specimens, any other variety:
1st, Weld Garden, $15.

PELARGONIUMS.— Show, twelve plants, not less than six varieties:
1st, Mrs. C. G. Weld, $25.
Six plants, not less than three varieties:
1st, Mrs. C. G. Weld, $10; 2d, Miss Cornelia Warren, $5.
One specimen plant:
1st, Mrs. C. G. Weld, $5; 2d, Miss Cornelia Warren, $3.
Zonale, one specimen plant:
1st, S. J. Goddard, $5.

RHODODENDRONS.— Group, not exceeding 300 sq. ft.:
1st, Walter Hunnewell, $100.
Group, not exceeding 300 sq. ft., varieties which have grown in Massachusetts without protection for at least five years:
1st, Walter Hunnewell, $100.

One specimen plant:
1st, Walter Hunnewell, $15.

Roses.— Group, to cover not more than 200 sq. ft.:
1st, Thomas Roland, $100.

Hybrid Perpetual, six plants, not less than three varieties:
1st, Miss Cornelia Warren, $10.

Hybrid Perpetual, one specimen plant:
Miss Cornelia Warren, $5.

Rambler, four varieties:
1st, Thomas Roland, $50.

Rambler, one specimen plant:
Thomas Roland, $10.

Schizanthus.— Six plants:
1st, Mrs. C. G. Weld, $12; 2d, Mrs. J. L. Gardner, $6.

Streptocarpus.— Twelve plants:
1st, Mrs. J. L. Gardner, $10; 2d, Mrs. C. G. Weld, $5.

Verbenas.— Eight plants in pots:
1st, Faulkner Farm, $10.

Artistic Display of Foliage and Flowering Plants.— To cover not less than 200 sq. ft.:
1st, A. M. Davenport, $100; 2d, W. W. Edgar Co., $50.

Stove or Greenhouse Foliage Plants.— Six:
1st, N. T. Kidder, $40.

Flowering Plant.— One specimen:
1st, N. T. Kidder, standard Fuchsia, $10; 2d, S. J. Goddard, Anthurium, $5.

Display of Dwarf Japanese Plants:
1st, Weld Garden, $75.

Miniature Japanese Garden:
1st, Kameyama & Serada, $30; 2d, Penn the Florist, $20.

Antirrhinums.— Six vases, twenty-five spikes each, not less than three varieties:
1st, Faulkner Farm, $20; 2d, S. J. Goddard, $10.

One vase, one or more varieties:
1st, P. E. Richwagen, $5; 2d, Mrs. C. G. Weld, $3.

Spanish Iris.— Six vases, twenty-five blooms each, not less than three varieties:
1st, Esty Bros., $10.

Marguerites.— One hundred blooms, Yellow:
1st, James Wheeler, $8.

Narcissi.— Ten vases, ten varieties, ten blooms each:
1st, Mrs. C. S. Minot, $10; 2d, Faulkner Farm, $5.

Pansies.— Display:
1st, William Sim, $10; 2d, C. T. Beasley & Co., $5.

Roses.— Display, covering not more than 100 sq. ft.:
1st, F. R. Pierson Co., $100.

Hybrid Teas, fifty blooms, White:
1st, F. R. Pierson Co., $25; 2d, McAlpine Bros., $15.
Fifty blooms, Red:
1st, Waban Rose Conservatories, Hadley, $25; 2d, McAlpine Bros. Crimson Queen, $15.
Fifty blooms, Pink:
1st, Waban Rose Conservatories, Mrs. Bayard Thayer, $25; 2d, F. R. Pierson Co., Ophelia, $15.
Fifty blooms, Yellow:
1st, F. R. Pierson Co., Mrs. Aaron Ward, $25; 2d, F. R. Pierson Co., Sunburst, $15.
Twelve blooms, Red (for private gardeners only):
1st, Mrs. C. G. Weld, $6.
Twelve blooms, Pink (for private gardeners only):
1st, Mrs. C. G. Weld, Mrs. Charles Russell, $6; 2d, Mrs. C. G. Weld, Mrs Moorfield Storey, $4.
Twelve blooms, Yellow (for private gardeners only):
1st, Mrs. C. G. Weld, Lady Hillingdon, $6.

Sweet Peas.— Display to cover not more than 50 sq. ft.:
1st, Faulkner Farm, $35.

Tulips.— Twelve vases, twelve varieties, ten blooms each:
1st, Faulkner Farm, $8.
Six vases, six varieties, ten blooms each:
1st, Weld Garden, $5.
Display of Darwin Tulips, not less than 50 sq. ft.:
1st, Weld Garden, $25.

Gratuities:

Mrs. C. G. Weld, group of Schizanthus, $5.
" " " " hanging basket of Fuchsias, $5.
Winthrop Ames, group of *Calceolaria Stewartii*, $15.
T. T. Watt, standard Hydrangea, $5.
E. B. Dane, *Hydrangea otaksa*, $8.
Faulkner Farm, " " $3.
Mrs. J. L. Gardner, Hydrangeas, $2.
E. A. Clark, Astilbe, $5.
Julius Roehrs Co., collection of rare Orchids, $25.
Miss Cornelia Warren, two Orchids, $3.
Blue Hill Nurseries, collection of hardy evergreens, $50 and Silver Medal.
Thomas Roland, *Bougainvillea Sanderiana*, $25 and Silver Medal.
Mrs. J. L. Gardner, Clarkia Salmon Queen, Hydrangea, and Stocks, $3.
Esty Bros., Ixias and Ranunculus, $2.
E. B. Dane, vase of Eschscholtzia, $1.
John Marshall, vase of Hunnemannia, $3.

H. R. Comley, display of plants and flowers, $6.
S. J. Goddard, standard Geranium J. J. Harrison, $5.
Kameyama & Serada, *Lilium longiflorum*, $2.
E. B. Dane, display of flowering and foliage plants, $50.
N. T. Kidder, foliage and flowering plants, $10.
Miss Cornelia Warren, group of flowering plants, $5.
T. T. Watt, flowering plants, $3.

May 27.

Gratuity:

Oliver Ames, display of Darwin and Cottage Tulips, $8 and Honorable Mention.

Peony Exhibition.

June 17 and 18.

H. H. Hunnewell Fund, No. 3.

Rhododendrons.— Largest and best collection, not less than fifteen distinct varieties, six trusses each, from plants that have grown in the open in Massachusetts for at least three years:
1st, T. C. Thurlow's Sons Co., $20.
Twelve distinct varieties, one truss each:
1st, T. C. Thurlow's Sons Co., $6; 2d, W. C. Winter, $4.
Six distinct varieties, one truss each:
1st, Weld Garden, $3.

Josiah Bradlee Fund.

German Irises.— Twenty-four vases of three trusses each, of not less than twelve varieties:
1st, E. M. Dunphe, $5; 2d, H. F. Chase, $3.
Hardy Herbaceous Flowers.— Twenty-five distinct species and varieties, not less than ten genera:
1st, Blue Hill Nurseries, $10.
Twenty distinct species and varieties, not less than eight genera (for private growers only):
1st, Weld Garden, $8.

Society's Prizes.

Herbaceous Peonies.— Collection of twenty named varieties, double, one flower of each:
1st, G. H. Peterson, $12; 2d, A. H. Fewkes, $8.

Collection of ten named varieties, double, three flowers of each:
1st, G. H. Peterson, $12; 2d, Mrs. C. S. Minot, $8.
Specimen bloom, double:
1st, G. N. Smith, $2; 2d, A. H. Fewkes, $1.
Collection of twelve named varieties, single, one bloom of each:
1st, Mrs. J. L. Gardner, $5.
Collection of six named double varieties, White, one flower of each:
1st, G. H. Peterson, $4; 2d, Mrs. C. S. Minot, $2.
Collection of six named double varieties, Rose Pink:
1st, G. H. Peterson, $4; 2d, Mrs C. S. Minot, $2.
Collection of six named double varieties, Salmon Pink:
1st, G. H. Peterson, $4; 2d, S. G. Harris, $2.
Collection of six named double varieties, Red or Crimson:
1st, G. H. Peterson, $4; 2d, S. G. Harris, $2.
Collection of twelve named double varieties, one flower of each (for non-commercial growers only):
1st, Mrs. J. L. Gardner, $8.
Collection of twelve blooms, Pink (for private gardeners only):
1st, Mrs. J. L. Gardner, $4.

Gratuities:

A. H. Fewkes, vase of Peony Mme. Calot, $3.
Mrs. J. L. Gardner, *Paeonia magnifica*, $5.
Wellesley Nurseries, collection of Peonies and Irises, $10.
J. K. Alexander, collection of Irises, $5.
Blue Hill Nurseries, collection of Day Lilies and Irises, $10.
E. B. Dane, display of cut Orchid blooms, $25 and Honorable Mention.
J. T. Butterworth, Orchids in bloom, $7.
Mount Desert Nurseries, artistically arranged group of hardy flowers, $20 and Honorable Mention.
Miss Cornelia Warren, collection of hardy flowers, $3.

Rose and Strawberry Exhibition.

July 1 and 2.

John Allen French Fund.

Hardy Roses.— Collection, named, not less than twenty varieties, filling fifty vases, one rose in each vase:
1st, T. N. Cook, $20; 2d, W. C. Winter, $15.

John C. Chaffin Fund.

Roses.— Best three blooms of any White Hybrid Perpetual Rose (for amateurs only):
1st, David Tyndall, $4; 2d, Robert Seaver, $2.
Best three blooms, Pink (for amateurs only):
1st, David Tyndall, $4; 2d, E. K. Butler, $2.
Best three blooms, Red (for amateurs only):
1st, David Tyndall, $4; 2d, David Tyndall, $2.
Basket of Hybrid Perpetual Roses, artistically arranged:
1st, Robert Seaver, $4; 2d, Robert Seaver, $2.
Twenty-four named varieties, one of each:
1st, T. N. Cook, $10.
Twelve named varieties, one of each:
1st, A. W. Preston, $5; 2d, J. B. Wills, $4.
Six named varieties, one of each:
1st, Robert Seaver, $4; 2d, A. W. Preston, $2.

John A. Lowell Fund.

Hybrid Tea Roses.— Collection of twelve varieties, one bloom of each:
1st, A. W. Preston, $10; 2d, E. K. Butler, $6.
Best three blooms of a Hybrid Tea variety introduced since 1913:
A. W. Preston, Crissie McKellar, $5.
Six blooms, any White variety:
1st, T. N. Cook, Killarney, $4; 2d, G. E. Barnard, Kaiserin Augusta Victoria, $2.
Six blooms, any Yellow variety:
1st, A. W. Preston, Mme. Melanie Soupert, $4; 2d, G. E. Barnard, Mrs. Aaron Ward, $2.
Six blooms, any Pink variety:
1st, A. W. Preston, Duke of Westminster, $4; 2d, A. W. Preston, $2.
Six blooms, any Red variety:
1st, A. W. Preston, George Dickson, $4; 2d, T. N. Cook, George Dickson, $2.
Basket, artistically arranged:
1st, Mrs. Albert Geiger, Jr., $5.
Sweet Williams.— Display, eighteen vases of three trusses each, not less than six varieties:
1st, Mrs. J. L. Gardner, $6; 2d, Mrs. C. G. Weld, $4.
Hardy Herbaceous Flowers.— Twenty-five vases, distinct species and varieties, not less than ten genera (for private growers only):
1st, Weld Garden, $10.
Campanula Medium.— Collection, filling twelve vases, one color in a vase:
1st, Weld Garden, $8; 2d, Mrs. C. G. Weld, $6.

Gratuitues:

T. N. Cook, collection of Roses, $8.
Mrs. C. G. Weld, display of hardy Roses, $5.
Miss Cornelia Warren, " " " " $3.
Eastern Nurseries, collection of climbing Roses, $2.
J. T. Butterworth, Hybrid Perpetual Roses, $2.
T. C. Thurlow's Sons Co., display of Peonies, $20.
A. H. Fewkes, collection of Peonies, $3.
Miss Cornelia Warren, *Campanula persicifolia*, $3.
Weld Garden, Digitalis in variety, $5.
Miss Cornelia Warren, Gloxinias, $2.
F. W. Fletcher Co., Delphinium Clivedon Beauty, $2.
E. B. Dane, collection of Orchid blooms, $20.
J. T. Butterworth, Orchid plant in bloom, $6.
Miss Cornelia Warren, display of Oncidiums, $8.
Eastern Nurseries, collection of herbaceous flowers, $3.
Mrs. E. S. Martin, vase of cut flowers, $1.

Sweet Pea Exhibition.

July 8 and 9.

John Allen French Fund.

Sweet Peas.— Twenty-five sprays, any White variety:
1st, Mrs. Robert Winthrop, Constance Hinton, $4; 2d, Edwin Jenkins, Edna May Improved, $2.
Twenty-five sprays, any Crimson or Scarlet:
1st, Edwin Jenkins, Sunproof Crimson, $4; 2d, Mrs. Robert Winthrop, Scarlet Emperor, $2.
Twenty-five sprays, any Carmine:
1st, Mrs. Robert Winthrop, Rosabelle, $4; 2d, Edwin Jenkins, George Herbert, $2.
Twenty-five sprays, any Yellow:
1st, A. N. Cooley, Mrs. Dameron, $4; 2d, Mrs. C. G. Weld, Mrs. Dameron, $2.
Twenty-five sprays, any Blue:
1st, Mrs. Robert Winthrop, Blue Monarch, $4; 2d, Edwin Jenkins, Blue Monarch, $2.
Twenty-five sprays, any Blush:
1st, Mrs. Robert Winthrop, Lady Evelyn Eyre, $4; 2d, Stuart Duncan, Agricola, $2.

Twenty-five sprays, any Deep Pink:
1st, Mrs. Robert Winthrop, Hercules, $4; 2d, Edwin Jenkins, Hercules, $2.

Twenty-five sprays, any Cream Pink:
1st, Stuart Duncan, Mrs. Hugh Dickson, $4; 2d, Stuart Duncan, Miriam Beaver, $2.

Twenty-five sprays, any Orange:
1st, Mrs. Robert Winthrop, Mary Unwin, $4; 2d, A. N. Cooley, Mary Unwin, $2.

Twenty-five sprays, any Lavender:
1st, Stuart Duncan, Orchid, $4; 2d, Edwin Jenkins, Don Alvar, $2.

Twenty-five sprays, any Purple:
1st, Mrs. Robert Winthrop, Royal Purple, $4; 2d, Stuart Duncan, Royal Purple, $2.

Twenty-five sprays, any Maroon:
1st, Stuart Duncan, John Ridd, $4; 2d, Mrs. Robert Winthrop, King Manoel, $2.

Twenty-five sprays, any Picotee edged:
1st, Mrs. Robert Winthrop, Jean Ireland, $4; 2d, A. N. Cooley, Dobbie's Blue Picotee, $2.

Twenty-five sprays, any Striped or Flaked Red or Rose:
1st, Edwin Jenkins, Jessie Cuthbertson, $4; 2d, Mrs. Robert Winthrop, Jessie Cuthbertson, $2.

Twenty-five sprays, any Striped or Flaked Blue or Purple:
1st, Mrs. Robert Winthrop, Bertha Usher, $4; 2d, A. N. Cooley, Bertha Usher, $2.

Twenty-five sprays, any Bicolor, other than Picotee-edged:
1st, Mrs. Robert Winthrop, Mrs. Cuthbertson, $4; 2d, A. N. Cooley, Mrs. Cuthbertson, $2.

Iris Kaempferi.— Collection of not less than six varieties, filling twenty-five vases:
1st, A. J. Jenkins, $8.

Society's Prizes.

(For amateurs only.)

Sweet Peas.— Best vase, White, twelve sprays to a vase:
1st, Thomas Burrows, Edna May, $3; 2d, Thomas Brook, Constance Hinton, $2.

Best vase, Pink:
1st, Thomas Brook, Hercules, $3; 2d, Mrs. P. G. Forbes, Miriam Beaver, $2.

Best vase, Dark Pink:
1st, Margaret J. Miller, George Herbert, $3; 2d, Willo Blossom, George Herbert, $2.

Best vase, Lavender:
1st, Thomas Brook, R. F. Felton, $3; 2d, Mrs. P. G. Forbes, Florence Nightingale, $2.
Best vase, Salmon:
1st, Margaret J. Miller, Barbara, $3; 2d, Miss R. V. Cook, Salmon Pink, $2.
Best vase, Crimson:
1st, Thomas Brook, Sunproof Crimson, $3; 2d, Miss R. V. Cook, $2.
Best Vase, Primrose:
1st, Thomas Brook, Dobbie's Cream, $3; 2d, Thomas Burrows, Floradale Fairy, $2.
Best vase, Scarlet:
1st, Thomas Brook, The President, $3; 2d, Margaret J. Miller, Fiery Cross, $2.
Best vase, any other color:
1st, Thomas Burrows, King Manoel, $3; 2d, Thomas Brook, Royal Purple, $2.

Wild Flowers.— Collection, named, one or more bottles of each kind:
1st, Albert Davidson, $5; 2d, Mrs. F. C. Upham, $4.

Gratuities:

Albert Jenkins, display of Sweet Peas, $15.
Mrs. W. G. Weld, " " " " $10.
Thomas Burrows, " " " " $2.
Margaret J. Miller, " " " " $2.
G. E. Barnard, " " " " $2.
Miss R. V. Cook, basket of Sweet Peas, $1.
A. W. Preston, display of Tea and Hybrid Tea Roses, $7.
Oliver Ames, vase of *Trachelium caeruleum*, $1.
Blue Hill Nurseries, display of hardy herbaceous flowers, $15.

July 15.

Hollyhocks.— Twenty-four blooms, not less than four varieties:
1st, W. G. Kendall, $4.
Twelve spikes:
1st, W. G. Kendall, $4.

Gratuity:

Eastern Nurseries, display of hardy herbaceous flowers, $6.

Gladiolus Exhibition.

August 11, 12, and 13.

Begonias, Tuberous Rooted.— Six plants:
1st, Weld Garden, $6.

Perennial Phloxes.— Twelve named varieties:
1st, Blue Hill Nurseries, $5; 2d, T. C. Thurlow's Sons Co., $4.

Gladioli.— Vase of twenty-five spikes, White, one variety:
1st, C. F. Fairbanks, Europa, $10; 2d, J. Thoman & Sons Co., Rochester White, $5.

Vase of twenty-five spikes, Red:
1st, C. F. Fairbanks, Red Emperor, $10; 2d, T. A. Havemeyer, Liebesfeuer, $5.

Vase of twenty-five spikes, Crimson:
1st, J. L. Childs, Rich Red, $10; 2d, C. W. Brown & Son, $5.

Vase of twenty-five spikes, Pink:
1st, T. A. Havemeyer, Panama, $10; 2d, C. F. Fairbanks, Panama, $5.

Vase of twenty-five spikes, Yellow:
1st, J. L. Childs, Sulphur King, $10; 2d, S. E. Spencer, Schwaben, $5.

Vase of twenty-five spikes, any other color:
1st, T. A. Havemeyer, Muriel, $10; 2d, C. F. Fairbanks, Mary Fennell, $5.

Vase of twenty-five spikes, any Lemoinei hybrid:
1st, T. A. Havemeyer, $10; 2d, J. L. Childs, Baron Hulot, $5.

Vase of twenty-five spikes, any Primulinus hybrid:
1st, C. F. Fairbanks, $10; 2d, C. W. Brown & Son, $5.

Largest and best collection of named varieties, one spike of each:
1st, J. L. Childs, $50; 2d, C. F. Fairbanks, $25.

Collection of fifty named varieties, one spike of each:
1st, T. A. Havemeyer, $20; 2d, J. L. Childs, $10.

Vase of six spikes, White, one variety:
1st, T. A. Havemeyer, Europa, $4; 2d, Jelle Roos, $2.

Vase of six spikes, Red:
1st, T. A. Havemeyer, Red Emperor, $4; 2d, John Zeestraten, Electra, $2.

Vase of six spikes, Crimson:
1st, J. L. Childs, George Paul, $4; 2d, Jelle Roos, Czar Peter, $2.

Vase of six spikes, Pink:
1st, John Zeestraten, Panama, $4; 2d, H. E. Meader, Myrtle, $2.

Vase of six spikes, Yellow:
1st, E. M. Smith, Schwaben, $4; 2d, C. F. Fairbanks, Schwaben, $2.

Vase of six spikes, any other color:
1st, T. A. Havemeyer, Loveliness, $4; 2d, C. F. Fairbanks, Julie Fairbanks, $2.
Vase of six spikes, any Lemoinei hybrid:
1st, H. E. Meader, Heliotrope, $4; 2d, T. A. Havemayer, Duval, $2.
Vase of six spikes any Primulinus hybrid:
1st, C. W. Brown & Son, $4; 2d, J. L. Childs, $2.
Vase of three spikes, White:
1st, Thomas Coggar, Europa, $2; 2d, Madison Cooper, Mrs. L. M. Gage, $1.
Vase of three spikes, Red:
1st, C. F. Fairbanks, $2; 2d, E. M. Smith, $1.
Vase of three spikes, Crimson:
1st, E. M. Smith, Red Amaryllis, $2; 2d, Jelle Roos, Rajah, $1.
Vase of three spikes, Yellow:
1st, Madison Cooper, Yellow Bird, $2; 2d, E. M. Smith, Niagara, $1.
Vase of three spikes, any other color:
1st, J. L. Childs, $2; 2d, E. M. Smith, Myrtle, $1.
Twelve vases, twelve named varieties, one spike of each:
1st, Iristhorpe Farm, $6; 2d, H. E. Meader, $3.
One vase, ten spikes, one variety (for amateurs only):
1st, Madison Cooper, Loveliness, $5; 2d, L. M. Fuller, Halley, $3.
Twenty-five spikes artistically arranged:
1st, J. Thoman & Sons, Rochester White, $10; 2d, E. N. Fisher, $5.

Charles F. Fairbanks Special Prizes.

Best Seedling Gladiolus, one spike:
1st, J. L. Childs, Seedling no. 3, $25; 2d, T. A. Havemeyer, Yellow Seedling, $10.

Gratuities:

Brookland Gardens, display of Gladioli, $15.
Thomas Coggar, " " " $10.
L. M. Gage, " " " $10.
C. W. Brown, " " " $5.
R. W. Swett, " " " $5.
J. K. Alexander, " " " $4.
Blue Hill Nurseries, display of hardy herbaceous flowers, $8.
Mrs. E. M. Gill, display of hardy flowers, $2.

Dahlia and Fruit Exhibition.

September 9 and 10.

Dahlias.— Show and Fancy, twelve blooms, named varieties:
1st, W. D. Hathaway, $3; 2d, G. L. Stillman, $2.
Cactus, twelve blooms, named varieties:
1st, W. D. Hathaway, $3; 2d, G. L. Stillman, $2.
Decorative, twelve blooms, named varieties:
1st, W. F. Hall, $3; 2d, A. W. Hayden, $2.
Peony-flowered, 12 blooms, named varieties:
1st, W. D. Hathaway, $3; 2d, G. L. Stillman, $2.
Pompon, twelve vases of three blooms each, named varieties:
1st, F. P. Webber, $3; 2d, W. D. Hathaway, $2.
Largest and best collection of named varieties, one vase of each:
1st, J. K. Alexander, $8.

Hardy Herbaceous Flowers.— Thirty bottles, distinct species and varieties, not less than ten genera (for private gardeners only):
1st, Faulkner Farm, $10.

Wild Flowers.— Collection, correctly named as far as possible, one bottle of each kind:
1st, L. D. Watson, $5; 2d, K. R. Craig, $4; 3d, Albert Davidson, $3; 4th, Mary M. Wheeler, $2.

Gratuities:

Mrs. L. A. Towle, display of Dahlias, $2.
G. L. Stillman, " " " $2.
J. K. Alexander, display of Gladioli, $8.
Wrentham Dahlia Gardens, " " " $2.
Blue Hill Nurseries, display of herbaceous perennials, $5.

Autumn Exhibition of Plants, Flowers, Fruits, and Vegetables.

November 1, 2, 3, 4, and 5.

Foliage and Flowering Plants.— Best arranged group covering 300 sq. ft.:
1st, A. M. Davenport, $100; 2d, W. W. Edgar Co., $50.
Best arranged group covering 150 sq. ft. (for private gardeners only);
1st, Mrs. J. L. Gardner, $50.

Orchid.— Best specimen:
1st, A. W. Preston, $8; 2d, N. T. Kidder, $6.
Orange Plants.— Six:
1st, W. W. Edgar Co., $10.
Chrysanthemums.— Group to cover 200 sq. ft.:
1st, A. M. Davenport, $100; 2d, Mrs. J. L. Gardner, $50.
Six trained specimen plants, any color or class:
1st, J. S. Bailey, $50.
One trained specimen plant, White:
1st, G. L. Stone, Garza, $15; 2d, Mrs. C. G. Weld, Garza, $10.
One trained specimen plant, Bronze:
1st, W. H. Wellington, Hortus Tolosanus, $15; 2d, W. H. Wellington, Mrs. William Duckham, $10.
Display, arranged with foliage plants, to cover not less than 100 sq. ft. (for commercial growers only):
1st, W. H. Elliott, $50; 2d, Kameyama & Serada, $25.
Palms.— Two Kentias:
1st, Mrs. J. L. Gardner, $12.
Begonias.— Gloire de Lorraine or any of its varieties, six plants:
1st, Mrs. Lester Leland, $25; 2d, G. L. Stone, $12.
Any other winter-flowering variety, six plants:
1st, E. S. Webster, Optima, $10.
Best Chrysanthemum plant on exhibition:
G. L. Stone, Garza, $20.

Henry A. Gane Memorial Fund.

Chrysanthemums.— For the best vase of blooms of the Mrs. Jerome Jones or the Yellow Mrs. Jerome Jones:
1st, James Nicol, $30.
For the best new seedling Chrysanthemum originated by any grower:
Nathan Smith & Sons, Miss Anola Wright, $15.

Society's Prizes.

Twenty-five blooms, twenty-five distinct named varieties:
1st, G. L. Stone, $30; 2d, W. H. Wellington, $15.
Twelve blooms, Japanese, named, in vases:
1st, G. L. Stone, $10; 2d, W. H. Wellington, $5.
Twelve blooms, Japanese Incurved:
1st, G. L. Stone, $10.
Twelve blooms, Reflexed:
1st, G. L. Stone, $10.
Twelve vases, Pompon, distinct varieties, six sprays in a vase:
1st, C. H. Totty, $5; 2d, E. K. Butler, $3.

Vase of ten blooms on long stems, Pink, named: 1st, Mrs. Lester Leland, $12; 2d, R. E. Traiser, $8.
Vase of ten blooms on long stems, Red:
1st, Mrs. Lester Leland, $12.
Vase of ten blooms on long stems, White:
1st, James Nicol, $12; 2d, R. E. Traiser, $8.
Vase of ten blooms on long stems, Yellow:
1st, Mrs. Lester Leland, $12; 2d, R. E. Traiser, $8.
Vase of twenty-five blooms, one or more varieties:
Mrs. Alice Sias, $25.
Collection of sprays of single Chrysanthemums filling twenty-five vases:
1st, C. H. Totty, $15; 2d, Scott Bros., $10.
Most artistic vase of Chrysanthemums with any foliage:
1st, W. W. Edgar Co., Robert Halliday, $30; 2d, W. W. Edgar Co., Chieftain, $15.
For the best display showing the various ways flowers can be used for home decoration:
Caplan the Florist, $50.

Carnations.— Six vases, fifty blooms each:
1st, Strouts, $30; 2d, A. A. Pembroke, $15.
One hundred blooms, mixed varieties:
1st, J. W. Minot, $15; 2d, A. A. Pembroke, $8.
Twenty-five blooms, mixed varieties (for private gardeners only):
1st, W. H. Wellington, $5; 2d, Mrs. Alice Sias, $3.

Gratuities:

Kamayama & Serada, group of flowering and foliage plants, $25.
Thomas Roland, " " " " " " $20.
Miss Cornelia Warren, flowering and foliage plants, $6.
G. L. Stone, trained Chrysanthemum, $5.
Mrs. C. G. Weld, " " $5.
A. N. Pierson, collection of cut Chrysanthemums, $10.
C. H. Totty, collection of cut Chrysanthemums, $5.
Mrs. C. G. Weld, display of winter-flowering Begonias, $15 and Silver Medal.
Mrs. J. M. Sears, collection of winter-flowering Begonias, $6.
Waban Rose Conservatories, Roses Mrs. Charles Russell and Hadley, $10.
Blue Hill Nurseries, seedling Evergreens, $5 and Honorable Mention.

Additional Awards.

Gold Medal.

March 17. R. & J. Farquhar & Co., Spring Flower Garden.
May 10. Charles Sander, group of Azaleas.

August 11. C. F. Fairbanks, for advancement in the cultivation and exhibition of the Gladiolus.

Silver Medal.

March 17. E. B. Dane, *Odontioda Bradshawiae* (*Odontoglossum crispum* × *Cochlioda Noetzliana*).
May 10. A. W. Preston, *Brasso-Cattleya Maroniae* (*Cattleya gigas* × *Brasso-Cattleya Digbyana*).
" " Albert Roper Estate, Carnation Albert Roper.
" " James Wheeler, superior cultivation of Marguerite Étoile d'Or.
" " Weld Garden, group of Japanese dwarf plants.
" " Penn the Florist, arrangement of flowers for home use.
" " Walter Hunnewell, *Rhododendron sinense*.
May 27. Bayard Thayer, *Lilium Willmottiae*.
June 17. Miss Grace Sturtevant, Iris Avalon.
" " R. & J. Farquhar & Co., display of hardy herbaceous flowers and shrubs.
July 1. A. J. Fish, collection of climbing hardy Roses.
July 8. S. W. Carlquist, collection of Sweet Peas.
July 15. Iristhorpe Farm, display of *Iris Kaempferi*.
August 26. L. M. Gage, *Gladiolus gandavensis* Mrs. Dr. Norton.
September 9. J. P. Rooney, Peony-flowered Dahlia Mrs. Frederick Grinnell.
" " Fottler, Fiske, Rawson Co., display of Gladioli and Dahlias.
November 1. A. W. Preston, Cattleya Lord Rothschild alba.
" " E. S. Webster, Begonia Optima.
" " E. H. Wetterlow, Begonia Mrs. Peterson.
" 25. Henry Stewart, superior cultivation of *Oncidium varicosum Rogersii*.

First Class Certificate of Merit.

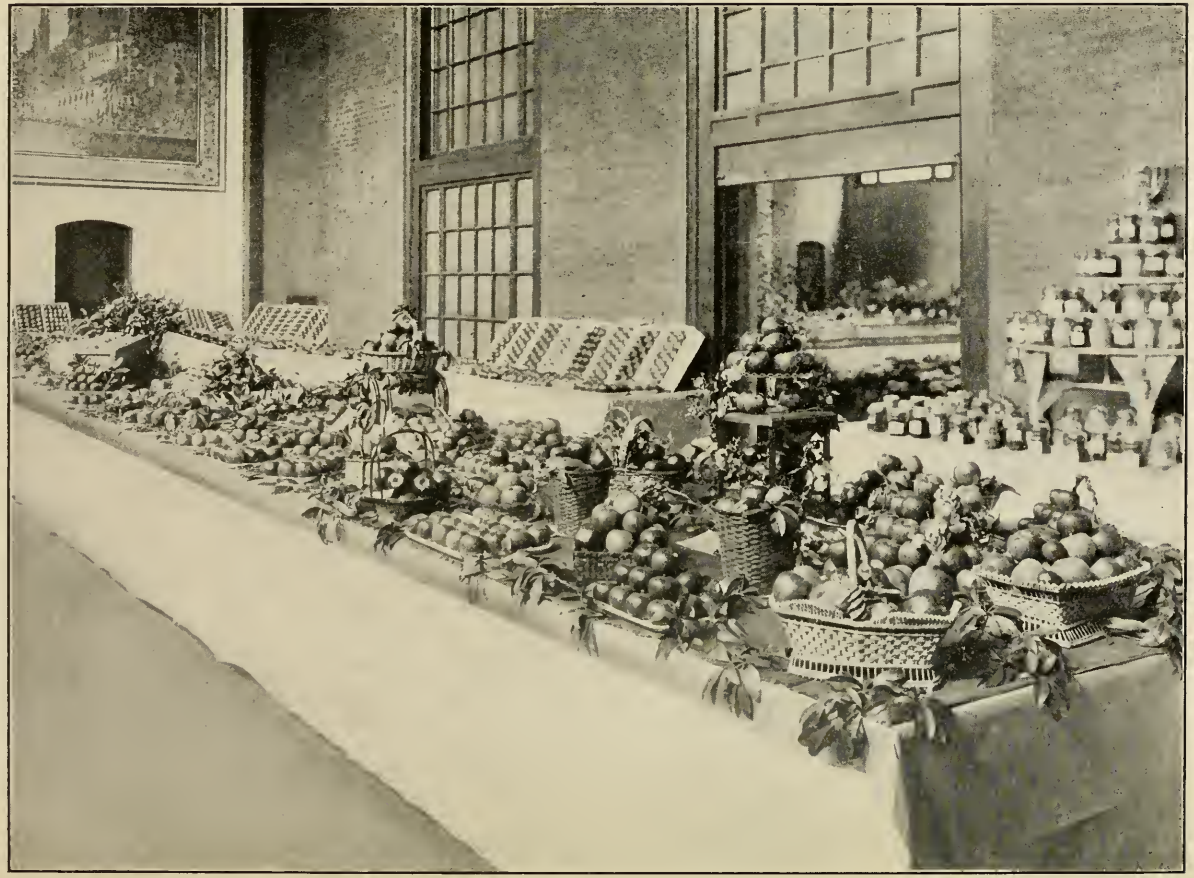
March 17. Mrs. C. G. Weld, vase of Antirrhinum Weld Pink.
" " Walter Hunnewell, superior cultivation of Dendrobiums.
" " T. H. Lemon Co., *Primula malacoides rosea*.
May 10. S. J. Goddard, Carnation Doris.
June 10. Miss Grace Sturtevant, Iris Merlin (Oriflamme × Iris King).
" " " " " " Mme. Cheri (Caterina × Mrs. G. Darwin).
June 17. " " " " Stanley H. White (Hector × Caterina).
July 1. Weld Garden, *Coelogyne Mooreana*.
September 9. E. W. Bennett, Decorative Dahlia Meritorious.
November 1. A. W. Preston, Cattleya Fabia alba.

Cultural Certificate.

March 17. Donald McKenzie, *Sophro-Cattleya Thwaitesii.*
May 10. C. S. Sargent, *Cytopodium punctatum.*

Honorable Mention.

March 17. A. N. Pierson, vase of Rose Lady Alice Stanley.
" " " " " " " " Red Radiance.
" " W. R. Nicholson, seedling Carnation, No. 51.
" " F. Dorner & Sons Co., vase of seedling Carnations.
" " S. J. Goddard, vase of Carnation Doris.
" " A. W. Preston, Cineraria (stellata × Salem Prize).
May 10. Peirce Bros., new Rose Tip Top.
" " E. H. Wetterlow, new Geranium Mrs. Lester Leland.
" " Walter Hunnewell, seedling Orchid: Laelio-Cattleya Waban.
" " F. W. Fletcher & Co., Delphinium Clivedon Beauty.
" " C. S. Sargent, group of *Rehmannia angulata* Pink Perfection.
" " " " " seedling Rhododendron (*R. Smirnowii* × garden variety).
May 27. Miss Grace Sturtevant, display of Hybrid Irises.
June 10. " " " Iris Empire (Monsignor × Aurea).
" " " " " " Niverna (Cypriana × Mrs. G. Darwin).
" " " " " " Hope.
June 17. R. & J. Farquhar & Co., collection of Fuchsias.
" " Miss Grace Sturtevant, Iris Ann Leslie (Dr. Bernice seedling).
" " Blue Hill Nurseries, vase of *Thalictrum aquilegifolium purpureum.*
July 1. H. F. Chase, seedling Peony Miriam.
" " T. N. Cook, new seedling Rambler Rose, No. 1.
July 15. Eastern Nurseries, display of hardy Spiraeas.
" " Dr. and Mrs. Harris Kennedy, display of Japanese Iris.
" " R. & J. Farquhar & Co., display of *Lilium regale.*
August 11. J. L. Childs, Gladiolus Evelyn Kirtland.
" " C. W. Brown, vase of Gladiolus Evaline.
October 7. Mount Desert Nurseries, display of hardy Asters and other herbaceous flowers.
" " T. T. Watt, vase of *Quisqualis parviflora.*
November 7. Mrs. J. M. Sears, Begonia Sylvia.
" " Mrs. C. G. Weld, Begonia Apricot.
" " C. H. Totty, new Geranium Wm. H. Waite.
" " C. E. Holbrow, seedling Rose (Christie Miller × Richmond).
" " Strouts, Carnation, No. 9.
" " " seedling white Carnation.
" " A. A. Pembroke, Carnation, sport of Benora.



A Portion of the Fruit Exhibition, November 1, 1916

REPORT OF THE COMMITTEE ON FRUITS FOR THE YEAR 1916.

By Edward B. Wilder, Chairman.

The peculiar atmospheric conditions had a very serious effect upon the fruit crop during the year. The heavy rains of the Spring and continued moisture prevented the foliage from thoroughly drying off and rendered spraying far less effective than usual.

The sooty fungus on the apples, a result of these conditions, has been very bad, much worse than for years. The lateness of the season caused the postponement of the Rose and Strawberry Exhibition to July 1st and the extension of the Fruit Schedule in the Sweet Pea Exhibition to July 15th.

Nevertheless, we had a good display of fruit at the Strawberry Exhibition consisting of seventy-five dishes of strawberries and twelve of cherries. The new arrangement of the berries on plates with their own foliage has been a great success and should be continued and improved.

It was encouraging to see more entries in the classes for foreign grapes, exhibits being made at the Gladiolus, Dahlia and Fruit, and Grand Autumn Exhibitions.

The October Show was very good when we consider the fact that many of the chief features had been transferred this year to the November Exhibition. Apples, pears, grapes, and other fruit occupied a large part of the main hall and the increase in the display of pears, and the fine collections of grapes were very encouraging.

The display of fruit at the Grand Autumn Exhibition, November 1–5, was by far the finest of the year and was without doubt the chief feature of the exhibition and the most attractive exhibit in recent years.

The tables of apples "arranged for decorative effect" in the small hall were greatly appreciated by the public, as were the very fine groups and single dishes of apples.

In the main hall were tables of pears, grapes, and quinces, and large collections of apples in the lecture hall. A noteworthy feature of this exhibition was the display of the "Peasgood's Nonesuch" apple by Mrs. Harry F. Fay of Lexington, Mass. This is an apple of English origin and averaged more than a pound apiece. They were grown on dwarf stock and the crop this year on one tree was 110 apples. There is no record of any previous exhibition of this variety of apple.

The good work done by this and other Societies in raising the requirements has largely eliminated the San José scale and discouraged the display of fruit with other blemishes.

We feel that this Society is falling behind and losing ground in its present narrow views for the fruit schedule and exhibitions.

The elimination of the third prize discourages the amateur and other exhibitors from doing their best, for if they go to the expense and labor of preparing an exhibit, be it a dish of twelve specimens or a collection and are just a little behind second prize, their labor and expense is in vain.

We have had exhibitors who come here, took third prize, received instruction and education, and went home encouraged to raise such fine fruit that they could take first prize with credit.

We also feel that the schedule of prizes should be arranged to give the fruits and vegetables a just and honest share of the prize money and not have their departments constantly reduced in favor of another.

All these and other things are against the broad policy established by the founders of this grand old Society and are estranging not only exhibitors but stanch members, whom we cannot afford to lose if we desire to continue the beneficent work done in the years gone by.

EDWARD B. WILDER
WILLIAM DOWNS
RALPH W. REES
} *Committee on Fruits.*

PRIZES AND GRATUITIES AWARDED FOR FRUITS.

1916.

Spring Exhibition.

March 17, 18, and 19.

Winter Apples.— Collection of not less than four varieties:
1st, D. R. Craig, $6.
Plate of one variety:
2d, Baker Farm, Northern Spy, $2.
Pears.— Plate of any variety:
1st, F. W. Dahl, Anjou, $3.

May Exhibition.

May 10, 11, 12, 13, and 14.

Gratuity:

N. T. Kidder, Roxbury Russet Apples, $1.

Rose and Strawberry Exhibition.

July 1 and 2.

Strawberries.— For the best collection of ten plates of 48 berries each, not less than six varieties:
1st, Wilfrid Wheeler, $25.
Six plates of 24 berries each, six varieties:
1st, G. V. Fletcher, $5; 2d, Wilfrid Wheeler, $4.
Two plates of 24 berries each, of any variety introduced since 1912:
1st, Louis Graton, St. Martin, $4.
For the best two plates of 48 berries each, of any variety:
1st, Louis Graton, St. Martin, $8; 2d, E. M. Brewer, Brewer, $6.
For the best three plates of 24 berries each, three varieties, arranged with their own foliage:
1st, Louis Graton, $5; 2d, W. C. Winter, $4.

For the best single plate of any variety, 24 berries, arranged with their own foliage:
1st, G. V. Fletcher, Marshall, $3; 2d, Louis Graton, St. Martin, $2.
Two plates of Barrymore: 24 berries each:
1st, Wilfrid Wheeler, $3; 2d, G. V. Fletcher, $2.
Two plates of Black Beauty:
1st, G. V. Fletcher, $3.
Two plates of Chesapeake:
1st, Louis Graton, $3.
Two plates of Golden Gate:
1st, W. C. Cooper, $3.
Two plates of Marshall:
1st, G. V. Fletcher, $3.
Two plates of Minute Man:
1st, Wilfrid Wheeler, $3.
Two plates of Senator Dunlap:
2d, G. V. Fletcher, $2.
Two plates of any other variety:
1st, Louis Graton, Brandywine, $3.

Cherries.— Two plates, 24 specimens each, of any Red variety:
1st, F. W. Dahl, Early Sweet, $3.
Two plates of any Black variety:
1st, G. V. Fletcher, Guigne Noire, $3.
Two plates of any White or Yellow variety:
1st, J. H. Fletcher, Royal Ann, $3; 2d, F. W. Dahl, White Heart, $2.
Best fruited branch of Cherries:
1st, F. W. Dahl, White Heart, $3; 2d, F. W. Dahl, Early Sweet, $2.

Gratuity:

Wilfrid Wheeler, collection of Strawberries, $2.

Sweet Pea Exhibition.

July 8 and 9.

Theodore Lyman Fund, No. 1.

Cherries.— Any Red variety, 96 specimens:
1st, E. B. Wilder, Downer, $3; 2d, F. W. Dahl, Early Sweet, $2.
Any White or Yellow variety:
1st, F. W. Dahl, White Heart, $3; 2d, Mrs. M. J. Merrill, Royal Ann, $2.
Any Black variety:
1st, G. V. Fletcher, Black Tartarian, $3.

Gratuities:

John Bauernfeind, collection of Gooseberries, $2.
Oliver Ames, Gooseberries, $1.
Samuel McMullen, " $1.
Oliver Ames, collection of Currants, $3.

JULY 15.

Theodore Lyman Fund, No. 1.

RASPBERRIES.— Cuthbert, 96 berries:
1st, Hillcrest Farm, $3.
Any other Red variety:
1st, Hillcrest Farm, June Bearer, $3.
Any White variety:
1st, E. B. Wilder, Souchette Blanc, $3.

Society's Prizes.

CURRANTS.— Fay's, 48 bunches:
1st, E. M. Brewer, $3; 2d, Oliver Ames, $2.
Perfection:
1st, Oliver Ames, $3.
Wilder:
1st, John Bauernfeind, $3.
Any other Red variety:
1st, Oliver Ames, Cherry, $3.
White Grape:
1st, Oliver Ames, $3; 2d, W. G. Kendall, $2.
Any other White variety:
1st, W. C. Winter, White Dutch, $3.
GOOSEBERRIES.— Columbus, 48 berries:
1st, W. G. Kendall, $3; 2d, W. C. Winter, $2.
Downing:
1st, W. G. Kendall, $3; 2d, John Bauernfeind, $2.
Industry:
1st, W. G. Kendall, $3.
Triumph:
1st, John Bauernfeind, $3.
Any other variety:
1st, W. G. Kendall, Bates, $3; 2d, W. G. Kendall, Chautauqua, $2.
Collection of six plates, 48 berries each:
1st, W. G. Kendall, $5; 2d, W. C. Winter, $4.

Gratuities:

Louis Graton, St. Martin Strawberry, $2.
Hillcrest Farm, Raspberries, $1.

Gladiolus Exhibition.

August 11, 12, and 13.

Samuel Appleton Fund.

Apples.— Best collection of Summer Apples:
2d, M. S. Wheeler, $8.
Best four varieties of Summer Apples:
1st, H. A. Clark, $8; 2d, M. S. Wheeler, $6.
Best single plate of Summer Apples:
1st, G. V. Fletcher, Sweet Bough, $3; 2d, M. S. Wheeler, Red Astrachan, $2.

Society's Prizes.

Pears.— Clapp's Favorite:
1st, G. V. Fletcher, $3; 2d, F. W. Dahl, $2.
Any other variety:
1st, W. C. Winter, Giffard, $3; 2d, F. W. Dahl, Dearborn Seedling, $2.
Peaches.— Greensboro:
1st, G. V. Fletcher, $3.
Any other variety:
1st, H. A. Clark, Mayflower, $3; 2d, G. V. Fletcher, Triumph, $2.
Six specimens, one variety:
1st, Weld Garden, Princess of Wales, $5; 2d, H. A. Clark, Mayflower, $4.
Nectarines.— Six specimens, one variety:
1st, Weld Garden, Pineapple, $5.
Plums, Japanese.— Any variety:
1st, E. L. Lewis, Red June, $3; 2d, M. S. Wheeler, Red June, $2.
Blackberries.— Any variety, 48 berries:
1st, W. C. Winter, Erie, $3; 2d, F. W. Dahl, Wilson, Jr., $2.
Blueberries.— 100 berries.
1st, C. H. Chamberlain, $3; 2d, M. S. Wheeler, $2.

John S. Farlow Newton Horticultural Society Fund.

Hothouse Fruits.

Grapes.— Black Hamburgh, two bunches:
1st, Weld Garden, $6.
Muscat of Alexandria:
1st, Weld Garden, $6.

Any other variety:
1st, Weld Garden, Madresfield Court Muscat, $6.

Gratuities:

Jennison's Floral Gardens, collection of seedling Blueberries, $2.
Hillcrest Farm, Japanese Wineberry, $1.
Jennison's Floral Gardens, Ideal Everbearing Strawberry, $1.
J. W. Brown & Son, collection of berries, $1.

Dahlia and Fruit Exhibition.

September 9 and 10.

John S. Farlow Newton Horticultural Society Fund.

Foreign Grapes.— Collection of not less than four varieties, two bunches each:
1st, Mrs. J. C. Whitin, $25.
Two bunches, Black:
1st, Mrs. J. C. Whitin, Black Alicante, $6.
Two bunches, White:
1st, Mrs. J. C. Whitin, Mrs. Pearson, $6.

Josiah Bradlee Fund.

Apples.— For the best collection of six varieties of Fall Apples:
1st, M. S. Wheeler, $10; 2d, Parker Bros., $8.

Benjamin V. French Fund, No. 1.

Peaches.— For the largest and best collection of native Peaches:
1st, H. A. Clark, $10; 2d, G. V. Fletcher, $6.

Marshall P. Wilder Fund.

Pears.— Bartlett:
1st, Mrs. Elbridge Torrey, $3; 2d, W. Heustis & Son, $2.
Clapp's Favorite:
1st, Mrs. Elbridge Torrey, $3; 2d, A. B. Howard & Son, $2.
Any other variety:
1st, F. W. Dahl, Dearborn Seedling, $3; 2d, W. Heustis & Son, Bonne d'Ezee, $2.

Society's Prizes.

Apples.— Best collection of Fall Apples:
1st, M. S. Wheeler, $15; 2d, Parker Bros., $10.
Best plate of Fall Apples:
1st, H. A. Clark, Gravenstein, $3; 2d, M. S. Wheeler, Red Astrachan, $2.
Melons.— Mrs. H. H. Rogers, three specimens:
1st, A. W. Preston, $3.
Peaches.— Belle of Georgia:
1st, H. A. Clark, $3; 2d, F. H. Evans, $2.
Carman:
1st, H. A. Clark, $3; 2d, F. H. Evans, $2.
Champion:
1st, H. A. Clark, $3; 2d, Louis Graton, $2.
Any other variety:
1st, H. A. Clark, Crosby, $3; 2d, H. A. Clark, Mountain Rose, $2.
Plums.— Collection of not less than four varieties, other than Japanese:
1st, A. B. Howard & Son, $5.
Single plate of any variety other than Japanese:
1st, F. W. Dahl, Bradshaw, $3; 2d, M. S. Wheeler, Gueii, $2.
Japanese Plums.— Single plate of any variety:
1st, M. S. Wheeler, Chabot, $3; 2d, Parker Bros., Abundance, $2.

John A. Lowell Fund.

Native Grapes.— Any White grape, six bunches:
1st, John Bauernfeind, Niagara, $3.
Any Purple Grape, six bunches:
1st, John Bauernfeind, Worden, $3.
Any Red Grape, six bunches:
1st, John Bauernfeind, Delaware, $3.
Collection of five varieties, three bunches of each:
1st, John Bauernfeind, $5; 2d, E. R. Farrar, $4.

Society's Prizes.

Collection of seasonable fruit, arranged for effect with foliage, to cover a space not larger than 24 sq. ft.:
1st, H. A. Clark, $15; 2d, F. W. Dahl, $12.

Gratuities:

Mrs. R. Goodnough, basket of Pears, $1.
Jennison's Floral Gardens, Ideal Everbearing Strawberry, Vote of Thanks.

October Fruit and Vegetable Exhibition.

October 7 and 8.

Apples.— Collection of not less than six varieties of Fall Apples, ripe, twelve of each:
1st, Elliott & H. W. Moore, $12; 2d, Parker Bros., $10.
Belleflower:
1st, C. S. Smith, $3; 2d, E. R. Farrar, $2.
Fall Pippin:
2d, Elliott & H. W. Moore, $2.
Fameuse:
1st, G. V. Fletcher, $3; 2d, Elliott & H. W. Moore, $2.
Gravenstein:
1st, C. S. Smith, $3; 2d, A. W. Fletcher, $2.
King:
1st, A. W. Fletcher, $3; 2d, M. J. Cain, $2.
Maiden Blush:
1st, Faulkner Farm, $3; 2d, T. L. Perkins, $2.
McIntosh:
1st, M. S. Wheeler, $3; 2d, Mrs. Timothy McDermott, $2.
Palmer Greening:
1st, E. R. Farrar, $3.
Pound Sweet:
1st, G. V. Fletcher, $3; 2d, C. T. Billings, $2.
Rhode Island Greening:
1st, D. R. Craig, $3; 2d, M. S. Wheeler, $2.
Twenty Ounce:
1st, H. A. Clark, $3.
Any other variety, ripe:
1st, C. S. Smith, Porter, $3; 2d, H. A. Clark, Wealthy, $2.

John S. Farlow Newton Horticultural Society Fund.

Pears.— Angouleme:
1st, F. W. Dahl, $3; 2d, Mrs. Elbridge Torrey, $2.
Anjou:
1st, F. W. Dahl, $3; 2d, A. F. Estabrook, $2.
Belle Lucrative:
1st, F. W. Dahl, $3; 2d, E. B. Wilder, $2.
Bosc:
1st, W. G. Kendall, $3; 2d, W. Heustis & Son, $2.
Clairgeau:
1st, F. W. Dahl, $3; 2d, W. Heustis & Son, $2.

Comice:
2d, Elliott & H. W. Moore, $2.
Dana Hovey:
1st, W. G. Kendall, $3; 2d, W. Heustis & Son, $2.
Hardy:
1st, F. W. Dahl, $3.
Louise Bonne de Jersey:
1st, Mrs. Elbridge Torrey, $3; 2d, F. W. Dahl, $2.
Marie Louise:
1st, Mrs. Elbridge Torrey, $3.
Onondaga:
1st, H. A. Lamb, $3.
Seckel:
1st, W. G. Kendall, $3; 2d, A. F. Estabrook, $2.
Sheldon:
1st, Mrs. Elbridge Torrey, $3; 2d, F. W. Dahl, $2.
Superfin:
1st, H. A. Clark, $3.
Urbaniste:
1st, F. W. Dahl, $3; 2d, E. B. Wilder, $2.
Any other variety:
1st, E. B. Wilder, Harris, $3; 2d, M. J. Cain, Souvenir du Congrès, $2.
Collection of pears, not more than twelve plates of twelve specimens each, and not less than six varieties:
1st, F. W. Dahl, $10; 2d, E. B. Wilder, $8.

Society's Prizes.

Native Grapes.— Agawam:
1st, John Bauernfeind, $3; 2d, W. G. Kendall, $2.
Brighton:
1st, John Bauernfeind, $3; 2d, W. G. Kendall, $2.
Campbell's Early:
1st, John Bauernfeind, $3; 2d, E. A. Adams, $2.
Concord:
1st, John Bauernfeind, $3; 2d, E. A. Adams, $2.
Delaware:
1st, John Bauernfeind, $3; 2d, W. G. Kendall, $2.
Herbert:
1st, John Bauernfeind, $3; 2, C. W. Libby, $2.
Isabella:
1st, C. W. Libby, $3; 2d, W. G. Kendall, $2.
Lindley:
1st, Samuel McMullen, $3; 2d, C. W. Libby, $2.

Moore's Diamond:
1st, John Bauernfeind, $3; 2d, C. W. Libby, $2.
Niagara:
1st, John Bauernfeind, $3; 2d, Mrs. Timothy McDermott, $2.
Prentiss:
1st, E. S. Martin, $3.
Salem:
1st, John Bauernfeind, $3; 2d, W. G. Kendall, $2.
Vergennes:
1st, John Bauernfeind, $3; 2d, E. S. Martin, $2.
Wilder:
1st, John Bauernfeind, $3; 2d, A. E. Adams, $2.
Worden:
1st, John Bauernfeind, $3; 2d, W. G. Kendall, $2.
Any other variety:
1st, C. W. Libby, McPike, $3; 2d, John Bauernfeind, Diana, $2.
Collection of hardy native grapes, not less than six varieties of three bunches each:
1st, John Bauernfeind, $10; 2d, C. W. Libby, $8.

PEACHES.— Champion:
1st, G. V. Fletcher, $3.
Any other variety:
1st, G. V. Fletcher, Elberta, $3; 2d, H. A. Clark, Elberta, $2.

PLUMS.— Any variety:
1st, M. S. Wheeler, Gueii, $3.

QUINCES.— Any variety:
1st, G. V. Fletcher, Orange, $3; 2d, D. R. Craig, Orange, $2.

BEST FRUITED BRANCH OF BALDWIN APPLES, not over 4 ft. long:
1st, M. S. Wheeler, $5; 2d, D. R. Craig, $3.
Best fruited branch of any other variety:
1st, D. R. Craig, Hubbardston, $5; 2d, Parker Bros., Ben Davis, $3.

BEST FRUITED BRANCH OF PEAR:
1st, D. R. Craig, $5; 2d, W. Heustis & Son, Dana Hovey, $3.

Gratuities:

G. V. Fletcher, collection of Peaches $3.
M. S. Wheeler, 2 twigs of Plums, $1.
Faulkner Farm, Hyslop Crabapples, $1.
T. T. Watt, Papaw, $1.
" " " Chinese Yam, $1.
Mrs. Ivan Panin, English Walnuts, $1.

Autumn Exhibition of Fruits and Vegetables.

November 1, 2, 3, 4, and 5.

Samuel Appleton Fund.

Apples.— Baldwin:
1st, A. B. Howard & Son, $3; 2d, S. A. Schwartz, $2.
Hubbardston:
1st, A. B. Howard & Son, $3; 2d, J. M. Schwartz, $2.

Benjamin V. French Fund, No. 1.

Apples.— R. I. Greening:
1st, Derby Farm, $3; 2d, D. R. Craig, $2.

Benjamin H. Pierce Fund.

For new seedling apple of merit:
M. J. Cain, seedling of Gravenstein, $10.

Society's Prizes.

Apples.— Bellflower:
1st, C. S. Smith, $3; 2d, W. H. Stone, $2.
Delicious:
1st, Derby Farm, $3.
McIntosh:
1st, Derby Farm, $3; 2d, A. B. Howard & Son, $2.
Northern Spy:
1st, E. R. Farrar, $3; 2d, H. A. Clark, $2.
Palmer Greening:
1st, H. C. Fuller Estate, $3; 2d, E. F. Adams, $2.
Pound Sweet:
1st, G V. Fletcher, $3; 2d, A. H. Prouty, $2.
Roxbury Russet:
1st, M S. Wheeler, $3; 2d, H. C. Fuller Estate, $2.
Sutton:
1st, A. B. Howard & Son, $3; 2d, G. V. Fletcher, $2.
Tolman Sweet:
1st, E. R. Farrar, $3; 2d, W. H. Atkins, $2.
Tompkins County King:
1st, M. J. Cain, $3; 2d, E. E. Cole, $2.

Winter Banana:
1st, E. F. Adams, $3; 2d, E. C. Witt, $2.
York Imperial:
1st, M. S. Wheeler, $3; 2d, M. J. Cain, $2.
Any other variety:
1st, Derby Farm, Pearmain, $3; 2d, A. B. Howard & Son, Bailey's Sweet, $2.
For the best collection of winter apples, not less than six varieties, twelve specimens of each:
1st, Derby Farm, $12; 2d, A. B. Howard & Son, $10.
Collection of apples arranged for decorative effect:
1st, A. B. Howard & Son, $20; 2d, E. M. Bruce, $15.
For the largest and best exhibit of apples, not less than ten varieties, five specimens of each:
1st, A. B. Howard & Son, $15; 2d, Derby Farm, $12.
For the best exhibit of apples in trays, not less than five trays and one or more varieties:
1st, A. B. Howard & Son, $25; 2d, Derby Farm, $15.

CRABAPPLES.— Twenty-four specimens, any variety:
1st, E. & H. W. Moore, $3; 2d, Faulkner Farm, $2.

QUINCES.— Any variety, twelve specimens:
1st, D. M. Rogers, $3; 2d, A. B. Howard & Son, $2.

CRANBERRIES.— Collection of not less than three varieties, half-peck of each:
L. J. Fosdick, $10.
Half-peck of any variety:
L. J. Fosdick, McFarlin, $5.

COLLECTION OF NATIVE AND FOREIGN FRUIT, arranged for effect:
1st, Mrs. R. Goodnough, $15; 2d, F. W. Dahl, $12.

NATIVE NUTS.— Collection of not less than four varieties, one quart of each:
1st, Mrs. F. Schultz, $4; 2d, Sarah A. Wheeler, $3.

Marshall P. Wilder Fund.

NATIVE GRAPES.— Collection of hardy native grapes, not less than three varieties, three bunches of each:
1st, John Bauernfeind, $10; 2d, C. W. Libby, $8.

John S. Farlow Newton Horticultural Society Fund.

PEARS.— Angouleme:
1st, Mrs. Elbridge Torrey, $3; 2d, F. W. Dahl, $2.
Anjou:
1st, M. J. Cain, $3; 2d, F. W. Dahl, $2.
Bosc:
1st, W. G. Kendall, $3; 2d, W. Heustis & Son, $2.

Dana Hovey:
1st, W. G. Kendall, $3; 2d, W. Heustis & Son, $2.
Langlier:
1st, E. B. Wilder, $3.
Lawrence:
1st, F. W. Dahl, $3; 2d, Derby Farm, $2.
Sheldon:
1st, F. W. Dahl, $3; 2d, G. V. Fletcher, $2.
Vicar:
1st, E. B. Wilder, $3; 2d, F. W. Dahl, $2.
Winter Nelis:
1st, F. W. Dahl, $3; 2d, A. B. Howard & Son, $2.
Any other variety:
1st, W. G Kendall, Seckel, $3; 2d, W. Heustis & Son, Clairgeau, $2.
Collection of six varieties of winter pears, twelve specimens of each:
1st, F. W. Dahl, $10; 2d, N. T. Kidder, $8.

Theodore Lyman Fund, No. 2.

Plums.— Any variety:
1st, M. S. Wheeler, Prune, $3; 2d, M. S. Wheeler, $1.

Gratuities:

Derby Farm, apples arranged for decorative effect, $10.
M. S. Wheeler, collection of winter apples, $6.
Parker Bros., " " " " $5.
C. A. Stone, Black Alicante Grape, $4.
W. G. Kendall, collection of grapes, $4.
W. C. Winter, collection of hothouse grapes, $3.
J. S. Bailey, hothouse grapes, $3.
J. A. Mason, Superb Everbearing Strawberry, Vote of Thanks.

A Corner of the T. J. Grey Co.'s Exhibit, November 1, 1916

REPORT OF THE COMMITTEE ON VEGETABLES FOR THE YEAR 1916.

By John L. Smith, Chairman.

The Committee on Vegetables is pleased to report that on the whole the year has been a very gratifying one. Climatic conditions during the early part of the season to be sure were unsettled, but, nevertheless, the exhibits indicated that these had been largely overcome by the exhibitors.

The Silver Medal for the best new vegetable introduced in 1916 was awarded to Dr. Frederick S. DeLue for a new yellow sweet corn named "Early Golden Giant." Dr. DeLue's record of it is as follows: Hybrid corn obtained by crossing Golden Bantam with Howling Mob eleven years ago and with continuous selecting since then, resulting in uniformity of color, sweetness, size and greater proportion of grain to the cob.

The exhibit of the T. J. Grey Company of Boston was one of the best we thought ever exhibited in the hall. It consisted of 44 different kinds and 196 varieties.

At times, your Committee was impressed with the feeling that there was a lack of interest on the part of many members of the Society in the exhibitions that are held. In this connection, it is well to bear in mind that the future success of the Massachusetts Horticultural Society depends upon something else besides financial support. While liberal donations should be appreciated and strong financial support is necessary for the success of a Society like ours, nevertheless, we should bear in mind that enthusiastic interest on the part of members is likewise essential.

Your Committee feels, too, that something should be done to stimulate interest on the part of less wealthy persons. The primary purpose of our Society is to encourage an interest in horticulture, feeling that in so doing, we are not only benefiting ourselves but the community as well. Your Committee has not given sufficient

thought to this situation to make any mature recommendation, but we feel that more liberality upon the part of judges, and an increase in the number of prizes, would result in the stimulation of interest among persons who now manifest no concern in the work that we are promoting. If our Society is to be an exclusive one, the number of our exhibits will become less each year, and we are afraid that these will be confined to the more expensive classes of vegetation. This is a condition that should be anticipated, and we feel that if persons of limited financial resources become interested in work of this nature, our exhibits will be more varied, and the acquisition of this new element will add strength to our organization. Bear in mind that this is merely a suggestion, made without giving the situation much thought.

It has been suggested that in the year 1918 the production of vegetables be emphasized. Your Committee is fully in accord with this, and feels that it is not too early to plan for this event. It will require extensive preparations, and intelligent and enthusiastic coöperation on the part of the members, and from the past history of this Society, a very satisfactory year in this respect can safely be predicted.

JOHN L. SMITH
HENRY M. HOWARD
WM. C. RUST
} *Committee on Vegetables.*

PRIZES AND GRATUITIES AWARDED FOR VEGETABLES.

1916.

William J. Walker Fund.

Beans.— String, fifty pods:
1st, W. J. Clemson, Black Valentine, $4.
Cucumbers.— Four:
1st, J. W. Stone, Long Green, $4; 2d, J. W. Stone, White Spine, $2.
Lettuce.— Four heads:
1st, M. E. Moore, Hittinger, $4; 2d, Hittinger Fruit Co., May King, $2.
Mushrooms.— Twelve specimens:
1st, F. W. Dahl, $4.
Radishes.— Four bunches:
1st, H. M. Howard, Scarlet Globe, $4; 2d J. W. Stone, Scarlet Globe, $2.
Rhubarb.— Twelve stalks:
1st, D. R. Craig, $4.

Gratuity:

W. J. Clemson, New Zealand Spinach, $1.

May Exhibition.

May 10, 11, 12, 13, and 14.

Benjamin V. French Fund, No. 2.

Asparagus.— Four bunches, twelve stalks each:
1st, Oliver Ames, $4.
Beans.— String variety, forced, one quart:
1st, N. T. Kidder, $4; 2d, W. J. Clemson, $2.
Cucumbers.— Four:
1st, J. W. Stone, $4; 2d, M. E. Moore, $2.
Lettuce.— Four heads of Tennisball:
1st, M. E. Moore, $4; 2d, W. J. Clemson, $2.
Any other variety:
1st, Faulkner Farm, Big Boston, $4; 2d, Oliver Ames, Big Boston, $2.
Radishes.— Four bunches:
1st, J. W. Stone, Scarlet Globe, $4; 2d, Oliver Ames, Crimson Globe, $2.

Rhubarb.— Twelve stalks:
1st, F. W. Dahl, $4; 2d, Oliver Ames, $2.
Spinach.— Two pecks:
1st, Charles Esty, Round Thick Leaf, $4.
Tomatoes.— Twelve specimens:
1st, J. W. Stone, Comet, $4; 2d, N. T. Kidder, Winter Beauty, $2.

Gratuities:

N. T. Kidder, Cauliflower, $2.
W. J. Clemson, " $1.
" " " collection of vegetables, $10.

May 27.

Gratuity:

Oliver Ames, collection of vegetables, $5.

June 17 and 18.

Gratuity:

Oliver Ames, collection of vegetables, $10.

Rose and Strawberry Exhibition.

July 1 and 2.

Beans.— String:
1st, W. J. Clemson, Black Valentine, $4.
Beets.— Twelve, open culture:
1st, W. J. Clemson, Crosby's Egyptian, $4; 2d, D. L. Fiske, Crosby's Egyptian, $3.
Cabbages.— Four specimens:
1st, W. Heustis & Son, Copenhagen, $4; 2d, W. Heustis & Son, Early Market, $3.
Cauliflower.— Four specimens:
1st, D. L. Fiske, White Queen, $6; 2d, Miss Elizabeth Thatcher, Snowball, $3.
Cucumbers.— Four specimens:
1st, J. W. Stone, White Spine, $4; 2d, Miss Elizabeth Thatcher, Telegraph, $3.
Lettuce.— Four heads:
1st, W. J. Clemson, $4; 2d, W. Heustis & Son, $3.
Peas.— Gradus or Thomas Laxton:
1st, E. L. Lewis, $4; 2d, Mrs. S. F. Gill, $3.

Sutton's Excelsior:
1st, E. L. Lewis, $4; 2, Mrs. S. F. Gill, $3.
Any other variety:
1st, E. L. Lewis, Little Marvel, $4; 2d, Mrs. S. F. Gill, Laxtonian, $3.
Collection of four varieties, fifty pods each:
1st, Mrs. S. F. Gill, $5.
Collection of Vegetables.— Ten varieties, tastefully arranged:
1st, W. J. Clemson, $15.

Gratuities:

Miss Elizabeth Thatcher, Mushrooms, $1.
E. L. Lewis, Carrots, $1.
W. Heustis & Son, collection of vegetables, $5.

July 15.

Gratuity:

Oliver Ames, Lister's Prolific Tomato, $1.

Gladiolus Exhibition.

August 11, 12, and 13.

Beans.— String, four quarts:
1st, Oliver Ames, $4; 2d, Miss Elizabeth Thatcher, $2.
Shelled, not Lima, two quarts:
1st, E. L. Lewis, $4.
Cucumbers.— White Spine variety, four specimens:
1st, J. W. Stone, $4; 2d, D. L. Fiske, $2.
Egg Plant.— Four specimens:
1st, W. J. Clemson, $4.
Onions.— Twelve specimens:
1st, Oliver Ames, $4; 2d, D. L. Fiske, $2.
Peppers.— Twelve specimens, any variety:
1st, D. L. Fiske, $4; 2d, Oliver Ames, $2.
Sweet Corn.— Twelve ears, Crosby:
1st, J. W. Stone, $4; 2d, E. L. Lewis, $2.
Twelve ears, any other variety:
1st, E. L. Lewis, Pocahontas, $4; 2d, D. L. Fiske, Quincy Market, $2.
Collection of Vegetables.— Fifteen varieties:
1st, W. J. Clemson, $20; 2d, A. J. Jenkins, $15.
Eight varieties:
1st, E. L. Lewis, $10; 2d, D. L. Fiske, $5.

SEPTEMBER 9 AND 10.

T. T. Watt, display of Tomatoes, Honorable Mention.
W. Heustis & Son, Celery, Vote of Thanks.
Louis Graton, Irish Cobbler Potatoes, Vote of Thanks.

OCTOBER FRUIT AND VEGETABLE EXHIBITION.

OCTOBER 7 AND 8.

BEANS.— Lima, any variety, four quarts, pods:
1st, Oliver Ames, Burpee's Bush, $4; 2d, D. L. Fiske, Burpee's Bush, $2.
Lima, any variety, shelled, one quart:
1st, M. Cahalan, $4; 2d, D. L. Fiske, $2.
String, four quarts:
1st, Oliver Ames, Valentine, $4; 2d, Miss Elizabeth Thatcher, Farquhar's Plentiful, $2.
Wax, four quarts:
1st, D. R. Craig, Golden Wax, $4; 2d, D. L. Fiske, Golden Wax, $2.
CAULIFLOWER.— Three heads:
1st, Frederic Cole, Snowball, $4; 2d, E. & H. W. Moore, Snowball, $3.
CHARD.— Three plants:
1st, E. L. Lewis, Lucullus, $3; 2d, Oliver Ames, Lucullus, $2.
SWEET CORN.— Twelve ears, any variety:
1st, E. L. Lewis, Stowell's Evergreen, $3; 2d, Mrs. Timothy McDermott, $2.
CUCUMBERS.— White Spine type, four specimens:
1st, J. W. Stone, $3; 2d, Mrs. Timothy McDermott, $2.
EGG PLANTS.— Four specimens:
1st, Oliver Ames, Black Beauty, $3; 2d, Oliver Ames, New York Improved, $2.
LETTUCE.— Cos or Romaine, six heads:
1st, D. R. Craig, $3; 2d, James Donald, $2.
Any other variety:
1st, E. L. Lewis, Big Boston, $3; 2d, Hillcrest Farm, Big Boston, $2.
PEPPERS.— Twelve specimens:
1st, E. L. Lewis, Chinese Giant, $3; 2d, Oliver Ames, Chinese Giant, $2.
TOMATOES.— Open culture, scarlet, twelve specimens:
1st, Oliver Ames, Chalk's Jewell, $3; 2d, E. L. Lewis, Stone, $2.
CULINARY HERBS.— Green, fresh, largest and best collection:
1st, J. A. Nixon, $5; 2d, Mrs. F. C. Upham, $3.

Gratuities:

R. E. Walsh, specimen Pumpkin, $5.
E. B. Dane. Ailsa Craig Onions, $3.
W. Heustis & Son, Celery, $3.
Faulkner Farm, Mushrooms, $3.
Miss Elizabeth Thatcher, Mushrooms, $1.
R. E. Walsh, collection of vegetables, $3.
Dr. F. S. DeLue, new variety of Sweet Corn: Golden Giant, Silver Medal.

Autumn Exhibition of Plants, Flowers, Fruits, and Vegetables.

November 1, 2, 3, 4, and 5.

Beets.— Any round variety, twelve:
1st, E. L. Lewis, $3; 2d, C. F. Jenkins, $2.
Any round variety, six (For cottagers only):
1st, Michael Cahalan, Edmands, $4; 2d, Michael Cahalan, Early Model, $3.
Chard, three plants:
1st, Faulkner Farm, $4; 2d, W. J. Clemson, $3.
Brussels Sprouts.— Four quarts:
1st, E. L. Lewis, $4; 2d, Oliver Ames, $3.
Cabbages.— Any ball-head variety, green, four specimens:
1st, Mrs. J. L. Gardner, $4; 2d, E. L. Lewis, $3.
Savoy, four heads:
1st, E. & H. W. Moore, $4; 2d, Oliver Ames, $3.
Any green variety (For cottagers only):
1st, J. D. Tilton, $4; 2d, J. D. Tilton, $3.
Carrots.— Any variety, twelve specimens:
1st, E. & H. W. Moore, $4; 2d, Oliver Ames, $3.
Cauliflowers.— Three heads:
1st. Frederic Cole, $4; 2d, C. F. Jenkins, $3.
Celery.— Any variety, four heads:
1st, Michael Cahalan, Paris Golden, $5; 2d, E. Jenkins, Paris Golden, $3.
Cucumbers.— White Spine type, four:
1st, J. W. Stone, $3.
Egg Plants.— Four specimens:
1st, Oliver Ames, $3.
Lettuce.— Cos or Romaine, six specimens:
1st, D. R. Craig, $3; 2d, James Donald, $2.

Mushrooms.— Twelve specimens:
1st, A. W. Crockford, $3; 2d, E. B. Dane, $2.
Onions.— Any variety, twelve:
1st, E. B. Dane, Ailsa Craig, $5; 2d, Mrs. Lester Leland, Ailsa Craig, $3.
Parsnips.— Twelve:
1st, W. Heustis & Son, $4; 2d, D. R. Craig, $3.
Peppers.— Twelve:
1st, E. L. Lewis, Chinese Giant, $4; 2d, E. L. Lewis, Squash, $3.
Pumpkin or Squash.— Heaviest specimen:
J. A. Thayer, $5.
Sugar or Winter Luxury, four:
1st, Faulkner Farm, $5; 2d, E. & H. W. Moore, $3.
Collection, two specimens of each variety:
1st, E. L. Lewis, $10; 2d, Oliver Ames, $5.
Tomatoes.— Any indoor scarlet variety, twelve:
1st, A. W. Crockford, $3; 2d, J. W. Stone, $2.
Turnips.— Collection, six specimens, not less than three varieties:
1st, M. S. Wheeler, $5; 2d, J. A. Thayer, $3.
Salad Plants.— Best collection:
1st, D. R. Craig, $6; 2d, J. A. Nixon, $4.
Collection of Vegetables.— Fifteen varieties, not more than one variety of a kind:
1st, E. Jenkins, $75; 2d, Oliver Ames, $50.
Eight varieties, not more than one variety of a kind:
1st, E. L. Lewis, $30; 2d, W. J. Clemson, $15.
Six kinds, distinct species (For cottagers only):
1st, Michael Cahalan, $12; 2d, F. W. Dahl, $6.

Levi Whitcomb Fund.

Potato.— Best seedling variety, not in commerce, grown for at least two years in New England, twenty-four specimens:
E. & H. W. Moore, Dibble's Russet, $20.

Society's Prizes.

For the best display of vegetables put up in glass jars:
1st, Hermine Schulz, $12.

Gratuities:

Faulkner Farm, decoration of kale and parsley, $5.
T. J. Grey Co., display of vegetables, $100.
E. L. Lewis, " " " $3.

REPORT OF THE COMMITTEE ON GARDENS FOR THE YEAR 1916.

By the Secretary.

Two visits only have been made by the Committee on Gardens during the year 1916. The curtailment of the Schedule of Prizes may have been the cause for the diminution of interest in this department of the Society's work. This committee was established early in the Society's history and has exerted a widespread and important influence in promoting the objects for which it was established. A revival of interest is expected during the coming year when the Schedule is to be rearranged and some of the old-time features which have proved so successful in the past are restored.

E. K. Butler's Estate at Jamaica Plain.

On June 5 the committee was invited to visit the estate of Mr. E. K. Butler at Jamaica Plain. This is a suburban estate of one and one-half acres liberally and tastefully planted with a great variety of ornamental trees and shrubs. Many fine specimens of coniferous and deciduous trees are included in the grounds or around the borders and on the day of the visit the rhododendrons and azaleas were in brilliant bloom.

A feature of the estate and one in which Mr. Butler is especially interested is his rose garden which, while not in flower at the time of the visit, gave evidence of what it would develop a few weeks later. The collection of other flowering plants as also the vegetable garden showed an economic utilization of the grounds.

The estate was awarded the Special Prize of $50.00 for an estate in Massachusetts of not more than three acres nor less than one acre that shows the best arrangement in planting and that is kept in the best order.

Walter Hunnewell's Estate at Wellesley.

On July 7 the committee had the privilege of inspecting the Hunnewell estate at Wellesley. Frequently described in detail in the annals of the committee during the past 60 years it is hardly necessary to repeat in this report what has been already written concerning this notable estate, one of the best known private places in the country.

It is now in the fullness of its greatest beauty and the magnificent specimens of trees and shrubs, many of them of rare varieties, make this estate of more than ordinary interest. Owing to the favorable season the foliage never looked better and the whole place showed the result of continued care and improvement. The Society's Gold Medal was awarded Mr. Hunnewell in recognition of his interest in maintaining the high standard of excellence of his estate.

R. M. Saltonstall, *Chairman*
David R. Craig
Jackson T. Dawson
William Nicholson
Charles Sander

Committee on Gardens.

REPORT OF THE COMMITTEE ON CHILDREN'S GARDENS.

By Henry Saxton Adams, Chairman.

The annual exhibition of the products of children's gardens was held at Horticultural Hall on Saturday and Sunday, September 2nd and 3rd. The appropriations for prizes were the same as the previous year, namely, $300.00, of which amount $200.00 was given by the State for the encouragement of agriculture among the children.

It has been interesting to watch the growth and development of the interest of children in gardening as shown in our exhibitions. The 1916 exhibition was the most successful ever held by the Society. Not only were there more exhibits but the quality has steadily improved until it now requires expert judging to properly award the prizes and your committee feels embarrassed at times in attempting it.

Most of our exhibits come from three types of gardens — city, suburban, and country. We have those who grow flowers and vegetables under the most trying conditions in the heart of the city and it is always surprising to see what success they have. These little gardeners we feel are deserving of great credit and encouragement. The other two classes represent products brought from suburban or country gardens, grown under favorable conditions and in many cases expert advice, and resulting in exhibits which have been grown and selected to compete with the best flowers and vegetables to be found in any show in the country. Truly our exhibitions are well worth continuing and are bringing forth wonderful results.

In comparing this exhibition with previous ones it is interesting to note that in 1912 there were 108 prizes as against 210 in 1916; the growth being so great as to make it difficult for your committee to make the awards in the limited time at its disposal. A word of appreciation should here be given to Mr. James Wheeler whose

work in arranging the exhibits is not easy and for his patience with the children and with the garden directors who swarm the exhibition hall all wanting his attention at the same time.

The exhibits from school gardens were excellent and an improvement in both quality and arrangement over other years was noted. The flowers from both school and home gardens were universally good and some large collections were shown. Perhaps the two classes of exhibits which attracted the most attention were the canned vegetables and the exhibits of wild flowers, berries, leaves, and grasses. One entry of canned vegetables by an individual exhibitor contained 28 bottles with 27 varieties, both growing and preserving the work of Miss Hermine Schulz of Roslindale. The Huntington School District, Brockton, sent in 134 bottles from 16 exhibitors of which one collection contained 28 jars. The Brockton High School Canning Club also presented a very creditable collection of 70 bottles. It was interesting to note the general interest taken in the collections of wild flowers of which we had 4 entries, the largest containing 172 vases.

The vegetables as before noted were better in every way than at any previous exhibit. In some of the classes we had large numbers of entries; of Beets there were 52 single entries, of String Beans 48, of Carrots 32, of Tomatoes 34, and so on with a total number of more than 250 single entries among the various varieties of vegetables for which prizes were offered.

Our appropriation was used up and many worthy exhibits could not be given awards. We look upon the exhibition of 1916 as most satisfactory proof of the value of this work with the children and believe that the members of the Society should be proud of the work we are doing. We ask for larger funds and encouragement from the Society and hope the members will make an effort to attend the exhibition in 1917 which bids fair to be even better than that of 1916.

A list of the important awards follows:

For the best collection of vegetables from a school garden:

First.— Waltham North Grammar School	$6 00
Second.— Belcher School Garden, East Milton	5 00
Third.— Mrs. G. H. Blood School Garden, Groton	4 00
Fourth.— Huntington School, Brockton	3 00

For the best collection of vegetables from a school garden established since January 1, 1913:

First.— Copeland School, Brockton 5 00
Second.— McKinley School, Brockton 4 00
Third.— Edward Everett School, Dorchester 3 00
Fourth.— Broadway and Lee St. Garden, Cambridge 2 00

For the best collection of vegetables from a school garden within five miles of the State House:

First.— Young Peoples Garden, Deerfield St., Boston 5 00
Second.— Norfolk House Center Garden, Roxbury 4 00
Third.— Sterling St. Garden, Boston 3 00
Fourth.— Roxbury Charitable Society 2 00
Fifth.— John Winthrop School, Dorchester 1 00

For the best collection of flowers from a school garden:

First.— Waltham North Grammar School 6 00
Second.— Belcher School, East Milton 5 00
Third.— Girls Industrial School, Dorchester 4 00
Fourth.— Winthrop School, Brockton 3 00
Fifth.— Little House Garden, South Boston 2 00

For the best collection of flowers from a school garden established since January 1, 1913:

First.— Belcher School, East Milton 5 00
Second.— Copeland School, Brockton 4 00
Third.— Groton School, Groton 3 00
Fourth.— Edward Everett School, Dorchester 2 00

For the best collection of flowers from a school garden within five miles of the State House:

First.— Young Peoples Garden, Boston 5 00
Second.— Norfolk House Center Garden, Roxbury 4 00
Third.— Roxbury Charitable Society 3 00
Fourth.— Broadway and Lee St. Garden, Cambridge 2 00
Fifth.— John Winthrop School, Dorchester 1 00

For the best collection of vegetables from a child's home garden:

First.— Hermine A. Schulz, Roslindale 5 00
Second.— James Spadea, Brockton 4 00
Third.— Wilson Metcalf, Brockton 3 00
Fourth.— Harold Turner, North Reading 2 00

For the best collection of flowers from a child's home garden:

First.— Margaret Thatcher, Brookline	$5 00
Second.— Gertrude Schulz, Roslindale	4 00
Third.— Ruth F. Merrill, Dorchester	3 00
Fourth.— Wilfrid Tuttle, Arlington	2 00
Fifth.— John Craton, Malden	1 00

For the best collection of flowers from a child's home garden within five miles of the State House:

First.— Gertrude Entner, 112 Myrtle St., Boston	3 00
Second.— Kenneth R. Craig, Brookline	2 00
Third.— Frederick Hoch, Roxbury	1 00
Fourth.— Minnie Webb, Roxbury	1 00

For the best collection of vegetables from a child's garden put up in glass jars by the exhibitor:

First.— Hermine A. Schulz, Roslindale	3 00
Second.— Gust W. Anderson, Brockton	2 00
Third.— Frank Reilly, Brockton	1 00

HENRY SAXTON ADAMS
DR. HARRIS KENNEDY
MRS. W. RODMAN PEABODY
MISS MARGARET A. RAND
JAMES WHEELER

Committee on Children's Gardens.

REPORT OF THE COMMITTEE ON LECTURES AND PUBLICATIONS FOR THE YEAR 1916.

By Wilfrid Wheeler, Chairman.

It is becoming increasingly difficult each year to find suitable lecturers to fill the course as offered by the Society, and while the interest in all subjects relating to horticulture still continues, the large number of lectures and demonstrations given by local and other organizations interested in horticulture serves to draw many from our lectures.

The question of shortening the course has been discussed by your committee with the idea of securing persons from a distance who might have a message to bring us. Our efforts along this line have so far failed, possibly because of distance, possibly because we are unable to offer large enough financial inducement. Your Chairman feels, however, that these lectures should not be given up, as they constitute one of the direct activities of the Society, and are as important to the society as are the exhibitions.

Many organizations are adopting the policy of having their lecture course go on with their exhibitions and this is proving very successful. Lectures relating to the plants, fruit, flowers, or vegetables exhibited are given and the public have the added inducement to come, in that they see the exhibit and learn about the process of growing the particular thing exhibited. This plan could be carried out, provided an upstairs lecture hall could be equipped in the building.

The course of 1916 consisted of eleven lectures, and an attendance of about two thousand was recorded. Lectures on fruit subjects seem still to draw the largest attendance, with gardens and plant exploring, close seconds.

The course as offered for 1917 is quite varied and some very interesting speakers have been secured. Your Chairman would like to suggest that in advertising the lectures this year that street

car dasher signs be used, as at the exhibitions, making it a prominent feature that the lectures are free.

The lectures of the year have all been published in the annual Transactions of the Society and thereby reach an additional circulation.

WILFRID WHEELER
JOHN K. M. L. FARQUHAR
F. C. SEARS
FRED A. WILSON
Committee. on Lectures.

REPORT OF THE DELEGATE TO THE STATE BOARD OF AGRICULTURE FOR THE YEAR 1916.

By Edward B. Wilder, Delegate.

As delegate from the Massachusetts Horticultural Society to the Massachusetts State Board of Agriculture I have the honor to submit the following report of the activities of the Board for the year of 1916.

The work of the Board has been increased the past year by the apple grading law, which became effective as a compulsory measure July 1, and the necessity for determining the distribution and prevalence of the white pine blister rust. The work of acquainting growers with the provisions of the apple grading law and regulations, begun in 1915, was continued in 1916, and demonstrations were given by inspectors in twenty-nine towns and cities and by farm bureaus and the Massachusetts Agricultural College packing school. Six deputy field inspectors and a chief deputy were appointed and regular inspection work was begun in September. To November 30 there were made 1,415 inspections of fruit produced or owned by 396 growers and packers.

Of the violations discovered, practically all were cases of incorrect marking. Some of the fruit growers seemed to have the impression that the provisions of the law were unduly strict and were afraid to attempt to grade under it. For this reason more apples were shipped to the Boston market in bushel boxes than ever before, and many growers marked their entire crop ungraded. Closer study will show that this law in its essentials is simple and it is believed that from now on a much larger proportion of fruit will be graded and packed as Massachusetts Standard A.

For the suppression of the white pine blister rust the legislature appropriated $10,000 and the Governor and Council $3,000 with provision for $2,000 more if needed. Altogether nearly $14,000 was expended by the Board for this purpose.

The thirty-eighth consecutive year of institute work has been completed with 161 institutes held. Poultry raising was the most popular subject; fruit topics stood second; while calls for lectures on vegetable growing, dairying, farm management, marketing, and forage crops, and on economic subjects, were frequent.

Bounties paid the thirty-four agricultural and horticultural societies applying aggregated $29,480.08. The appropriation of $2,000 for bounties to poultry associations was apportioned among 14 of the 17 applying, each association receiving about two-thirds of what it had expended in "State first premiums."

Boys' and girls' agricultural clubs were conducted under the following titles: — "Home and School Garden Club," "Market-garden Club," "Potato Club," "Pig Club," "Home Economics Club," "Canning and Marketing Club," "Poultry Club," and "Calf Club." At the National Dairy Show held at Springfield in October there was assembled the greatest exhibit ever held of garden products, live stock, canned goods, and clothing, wholly the product of boys and girls under nineteen years of age. Judging and athletic contests were also held.

The public winter meeting of the Board at Horticultural Hall, Boston, in January, brought out a splendid corn and apple show, as well as an exhibit of boys' and girls' club work. There were also exhibits from the Dairy Bureau, the State Ornithologist, and a milk, cream and butter show conducted by the Massachusetts Dairymen's Association. The exhibition as a whole was far and away the best the Board has so far held in connection with its public winter meeting, and interest was evinced by the large attendance all three days of the exhibition.

A special prize of $25 was offered through the Board by a friend for the best acre of potatoes in the town of Phillipston, and certain other similar prizes were offered in the same way. Some of the money offered at the dairy show at Amherst was provided by the Board, and a very good show resulted. The Board, as last year, offered prizes for a beekeeper's exhibit at the Worcester and Greenfield fairs; and under the direction of Dr. B. N. Gates a very attractive exhibit was gotten together.

The orcharding contest was also conducted as in 1915 by the committee on orcharding and fruit growing, and judged by F. Howard Brown with the following results: —

Class 1. Peaches.

No entries.

Class 2. Pears.

Section 1.— For best orchard of not less than 1 acre: First, Fred Steele, Stoneham, $25; no second prize; third, W. H. Atkins, South Amherst, $10.

Section 2.— For the best crop from a single tree: First, W. A. Root, Easthampton, $10; second, J. Corey & Son, Truro, $5.

Class 3. Apples.

Section 1.— For the best orchard of 1 acre of standard apple trees; trees must have been planted in fall of 1911, spring or fall of 1912 or 1913, or spring of 1914: First, J. H. Hardy, Jr., Littleton, $25; second, R. L. Everit, Barre, $15; third, Patten Brothers, Sterling, $10. (Honorable mention and gratuities of $5 each, John Chandler, Sterling Junction; J. T. Geer, Three Rivers; W. D. Gleason, Sterling Junction; C. A. Wilson, Medway.)

Section 2.— For the best orchard of not less than 3 acres; trees must have been planted in fall of 1911, spring or fall of 1912 or 1913, or spring of 1914: First, O. C. Searle & Son, Easthampton, $25; second, John Chandler, Sterling, $15; third, tie between A. S. Geer, Three Rivers, $5, and J. M. Burt, East Longmeadow, $5. (Honorable mention and gratuity, H. A. Dunbar, Richmond, $5.)

Section 3.— For the best apple orchard in bearing, size of orchard not specified; no trees planted earlier than the fall of 1901 to be eligible: First, Edward F. Belches, Framingham, $25; second, W. H. Atkins, South Amherst, $15; third, Cyrus D. Ordway, West Newbury, $10.

Section 4.— For best old apple orchard renovated: First, O. C. Searle & Son, Southampton, $25; second, Wright A. Root, Easthampton, $15; third, Sumner L. Howe, Marlborough, $10. (Honorable mention and gratuity of $5 each to Naquag Farm, Rutland; Ralph F. Barnes, Marlborough; the Misses Noyes, Methuen.)

Section 5.— For the best yield of marketable apples from a single tree planted in fall of 1901 or later: First, W. A. Root, Easthampton, $10; second, W. H. Atkins, South Amherst, $5.

Section 6.— For best yield of marketable apples from a single tree planted in spring of 1901 or earlier: First, W. H. Atkins, South Amherst, $10; second, O. C. Searle & Son, Southampton, $5.

In the class for renovated orchards Mr. O. C. Searle of Southampton had a good record with a yield of 1,200 bushels. In the class for best yield from single pear tree, W. A. Root of Easthampton won with a Clapp's Favorite tree yielding 20 bushels.

In the class for best yield of apples from an old tree W. H. Atkins of South Amherst carried off first prize, with a yield of 45½ bushels.

In this connection an extract from the report of the judge may be of interest.

> We found different troubles more prominent in different sections as was to be expected, red-humped caterpillar being much more plenty in the central and western sections, while, of course, the gypsy moths were plenty in the eastern section, on account of the bad weather during spray time. The results of spraying, so far as gypsy moths were concerned, were largely nullified....
>
> In spite of the shortage of labor this year on all the farms we have never seen finer orchards nor some in better condition.

The contests for the encouragement of dairying were continued as in the three years preceding, the Legislature having renewed the appropriation for a similar period. Cash prizes aggregating $2,700 were offered. There were 653 entries and 578 contestants. Cash prizes were also offered to local inspectors of milk and to coöperative creameries.

The small amount allowed by the Legislature for the inspection of apiaries made it difficult to properly cover the State. With the development of large orchards and plantations of small fruits, and the growth of the cucumber industry, more bees are needed and greater protection should be afforded. A disease known as bee paralysis made its appearance. Little is known as to its origin and control but it is said that this disease killed over 80 per cent of the bees in England.

Nursery inspection followed along much the same lines as formerly, although the work was increased to cover the gypsy and brown-tail moth inspection in the smaller nurseries which were not covered by the government inspectors. The increase in the number of nurseries and a larger planting have made more demands upon the inspection force.

The work of the Dairy Bureau was broadened by legislative authority so as to include encouragement of the dairy industry. It has had charge of the clean milk contest, and has held exhibits and issued pamphlets. Fewer prosecutions than usual have been made although the same strict watch has been kept for violations of the dairy laws.

Interest in bird life is increasing year by year, and the character of the work done by the State Ornithologist is being more and more appreciated. The Ornithologist has continued his observations of birds as protectors of crops and of their distribution and habits, and has written several bulletins and circulars.

The Board held its Summer Field Meeting at Great Barrington in June and its annual meeting at Boston in December. Six new members were seated, and two members automatically dropped because their respective societies held no fair. The Massachusetts Federation of County Leagues and Farm Bureaus was represented by a delegate for the first time. At the close of the year there are 41 members of the Board of whom 32 represent as many agricultural and horticultural societies.

REPORT OF THE SECRETARY AND LIBRARIAN FOR THE YEAR 1916.

The Secretary and Librarian presents herewith his fifteenth annual report covering the eighty-sixth year of the Society's history.

The ten exhibitions of the products of the garden, farm, and orchard held during the year have been, on the whole, creditable to the Society and the public interest in them has been well sustained.

Extensive preparations were made for the Spring Flower Show of March 17–19, but the exhibits were somewhat lessened by the unfavorable weather conditions prevailing that week around Boston, the temperature ranging from 10 to 15° above zero.

The season during the first half of the year was cold and backward necessitating the postponement for a week of the scheduled dates of the Peony and the Rose and Strawberry Exhibitions, the latter occurring July 1 which appears to be the latest date on record for this exhibition.

The Sweet Pea and Gladiolus Exhibitions though held on the scheduled dates were a week too early for growers in the vicinity of Boston, but owing to large entries from other parts of the country these proved to be very satisfactory, especially the Gladiolus Exhibition which was made of more than the usual interest by the exhibits of the American Gladiolus Society which held its Seventh Annual Exhibition in connection with the Society's show. An immense collection of this popular flower was staged practically filling the three halls of the building.

The Exhibition of the Products of Children's Gardens held September 2–3 was the largest and best ever held. The interest and enthusiasm of the young gardeners seem to be increasing every year and promise well for the future development of gardening. The committee having this department in charge should receive the Society's most liberal encouragement for it is doing a practical work in advancing the interest in horticulture among the young people.

The Autumn Exhibition of Plants, Flowers, Fruits, and Vegetables held November 1–5, while somewhat below the average in floral displays, was noteworthy for the fruit and vegetable exhibits, which were of unusual excellence and in their artistic arrangement were equal to anything ever before shown in the halls.

The other details of the year's activities will be fully set forth in the reports of the various committees and it would be only a repetition to dwell further upon them in this report.

The publications of the Society for the year have been as follow:

February 24. Schedule of Prizes and Exhibitions for the year 1916, 56 pp.

May 4. Transactions, 1915, Part II, pp. 114–267, and Plates 1–4.

May 16. Preliminary Schedule of Exhibition of March, 1917, 8 pp.

August 23. Transactions, 1916, Part 1, pp. 1–143.

The Library.

The usual flow of horticultural and agricultural accessions has continued through the year, although the receipt of some foreign periodicals has been interrupted on account of the European war. The library seems to be more and more appreciated as is evident from the use made of it by specialists from various sections of the country who find it necessary to consult it in investigating subjects of horticultural interest.

The collection of nurserymen's and seedsmen's trade catalogues has been increased by 534 during the year making the total number of these 9740. This collection is proving of much historical value, especially in determining the origin and date of introduction of many of our popular garden plants, fruits, and vegetables.

And lastly, and perhaps most important, the librarian is pleased to state that the new catalogue is now being printed and a considerable portion of it is already in type.

William P. Rich,
Secretary and Librarian.

REPORT OF THE TREASURER FOR THE YEAR 1916.

MASSACHUSETTS HORTICULTURAL SOCIETY *in account current with* WALTER HUNNEWELL, *Treasurer, December 31, 1916.*

DR.

Paid for Library from Appropriation	$272 25
" " " " J. D. W. French Fund	105 54
" " " " J. S. Farlow Fund	62 64
" " Heating	1,105 61
" " Lighting	841 20
" " Labor	2,257 73
" " Stationery and Printing	1,362 93
" " Postage	198 00
" " Insurance	335 85
" " Incidentals	1,130 31
" " Repairs	607 80
" " Committee on Lectures and Publications	463 00
" " Salaries of Officers	4,439 92
" " " Committee on Plants and Flowers	316 00
" " " " " Fruits	141 66
" " " " " Vegetables	136 00
" " " " " Prizes & Exhibitions	271 20
" " Medals	439 63
" " Prizes for Plants and Flowers	5,580 00
" " Prizes for Fruits	1,203 00
" " Prizes for Vegetables	873 00
" " Prizes for Children's Gardens	393 01
" " H. A. Gane Fund	45 00
" " John C. Chaffin Fund	49 00
" " John Lewis Russell Fund	20 00
" " G. R. White Medal of Honor Fund	229 63
Balance December 31, 1916, Treasurer and Bursar	17,032 10
	$39,912 01

Cr.

Balance December 31, 1915				$8,072 41
Received Rents			4,150 98	
" Exhibitions	5,547 25			
" less expenses	1,638 11		3,909 14	
" Membership Fees (389. Income a/c, 275. Perm. Fund)			664 00	
" State Bounty			1,000 00	
" Sundry Donations			188 61	
" Mount Auburn Cemetery (1340.22 Income a/c, 1340.22 Perm. Fund)			2,680 44	12,593 17
" Interest on securities from the following funds:				
S. Appleton			40 00	
J. A. Lowell			40 00	
T. Lyman			440 00	
J Bradlee			40 00	
B. V. French, No. 1			20 00	
H. H. Hunnewell			160 00	
W. J. Walker			94 16	
L. Whitcomb			20 00	
B. B. Davis			20 00	
M. P. Wilder			40 00	
J. L. Russell			40 00	
F. B. Hayes			400 00	
H. A. Gane			40 00	
J. S. Farlow			100 00	
J. D. W. French			200 00	
B. H. Pierce			32 00	
J. C. Chaffin			40 00	
B. V. French, No. 2			120 00	
G. R. White			300 00	
J. S. Farlow, Newton			116 00	
J. A. French			200 00	
				2,502 16
" Interest and dividends on securities other than those for the above funds				10,144 27
" George Robert White Medal of Honor				1,500 00
" Special Fruit Show, 1917				100 00
" Bequest of Miss Helen Collamore				5,000 00
				$39,912 01

Assets.

Real Estate	$518,564 63
Furniture and Exhibition Ware	10,796 96
Library	45,110 47
Plates and History	235 50
$2,000 Kansas City, Clinton, and Springfield Bonds	1,980 00
10,000 Lake Shore and Mich. So. Bonds	10,415 25
21,000 City of Newton Bonds	24,228 75
50,000 Atch. Topeka and S. F. Bonds	44,693 25
50,000 Chicago Burl. and Quincy Bonds	50,012 50
10,000 Chicago and West Mich. Bonds	9,987 50
25,000 K. C. F. S. and Memphis Bonds	27,523 75
50,000 C. B. and Q. Illinois Bonds	51,625 00
8,000 Boston and Maine Bonds	8,710 00
4,000 Am. Tel. & Tel. 4% Bonds, 1936	4,110 00
4,000 United Fruit 5 % Notes, 1918	3,840 00
4,000 Interboro 5 % Bonds, 1966	3,920 00
12,000 Pacific Telephone Bonds	11,670 00
260 shares General Electric Stock	12,909 90
Hayes and Loring, Trustees	2,308 66
Cash in hands of Treasurer and Bursar	17,032 10
	$859,674 22

Liabilities.

Funds invested in Bonds and Stocks:	
S. Appleton Fund	$1,000 00
J. A. Lowell "	1,000 00
T. Lyman "	11,000 00
J. Bradlee "	1,000 00
B. V. French, No. 1 "	500 00
H. H. Hunnewell "	4,000 00
W. J. Walker "	2,354 43
L. Whitcomb "	500 00
B. B. Davis "	500 00
M. P. Wilder "	1,000 00
J. L. Russell "	1,020 00
F. B. Hayes "	10,000 00
H. A. Gane "	1,184 00
J. S. Farlow "	2,540 80
J. D. W. French "	5,242 97
B. H. Pierce "	800 00

J. C. Chaffin Fund	$1,250 89	
B. V. French, No. 2 "	3,000 00	
J. A. French "	5,000 00	
G. R. White "	7,673 45	
J. S. Farlow, Newton "	2,900 42	
Library Catalogue "	1,670 00	
Special Fruit Show 1917	100 00	
Unrestricted Funds	5,000 00	$70,236 96
Surplus		789,437 26
		$859,674 22

WALTER HUNNEWELL,
Treasurer.

MEMBERSHIP OF MASSACHUSETTS HORTICULTURAL SOCIETY.

DECEMBER 31, 1916.

Life Members, December 31, 1915		773	
Added in 1916		9	
Changed from Annual		2	
		784	
Deceased		24	760
Annual Members, December 31, 1915		168	
Added in 1916		8	
		176	
Deceased	1		
Changed to Life	2		
Resigned	2	11	165
Dropped for non payment of dues	6		
Membership, December 31, 1916			925

INCOME FROM MEMBERSHIP.

9 New Life members at $30	$270 00
8 New Annual Members at $10	80 00
2 changed to Life	40 00
Assessments for 1916	274 00
	$664 00

WALTER HUNNEWELL,
Treasurer.

AUDITOR'S CERTIFICATE.

40 State Street, Boston,
March 30, 1917.

To the Finance Committee of the
Massachusetts Horticultural Society.

Gentlemen:

As requested by you I have made a thorough audit of the books and general accounting affairs of the Massachusetts Horticultural Society for the year which ended with the thirty-first day of December, 1916, and herewith submit to you my report of the same.

Report.

I have proved the correctness of the ledger, journal, and cash books and the small books tributary to the cash books, and saw that all balances were properly carried forward. I examined all vouchers and checks representing the disbursements during the year and found the amount of cash required by the cash book upon the first day of January, 1917, to have been on hand, and also examined the securities of the Society, finding them in all details in accordance with the requirements of the records. I traced all postings from the journal and cash books into the ledger and certify that the balance sheet taken from it as of the 31st day of December, 1916, is a correct abstract and that the Treasurer's statement of the assets and liabilities of the Society upon said date is true to the best of my knowledge and belief.

In short, I satisfied myself that the work in connection with the accounting affairs of the Society is being intelligently and faithfully performed and that the books and papers of the Society are in commendable condition.

Yours very respectfully,

Andrew Stewart,
Certified Public Accountant.

THE ANNUAL MEETING, NOVEMBER 18, 1916.

ANNUAL MEETING FOR THE YEAR 1916.

The Annual Meeting of the Massachusetts Horticultural Society for the year 1916 was held at Horticultural Hall, Boston, on Saturday, November 18, at twelve o'clock, noon, with Vice President, Nathaniel T. Kidder, in the chair.

The Secretary announced that the meeting was called in accordance with the requirements of the By-laws of the Society for the purpose of electing a President, a Vice President, four Trustees, and a Nominating Committee for the ensuing year, and for the transaction of such other business as might be legally presented.

The President appointed E. B. Wilder, J. A. Crosby, and W. P. Rich a committee to receive, assort, and count the ballots, and report the number, and declared the polls open, to remain open until three o'clock.

The record of the preceding meeting of the Society was read by the Secretary and duly approved.

Vice President Kidder stated that in compliance with the provisions of Section IX. of the By-laws the Board of Trustees had made an appropriation of $6000.00, in addition to the income of the special prize funds of the Society, for prizes and gratuities for the year 1917 and $350.00 for prizes for children's gardens.

Messrs. Ufford, Barber, Butler, and Farquhar made suggestions for increasing the interest in these meetings as well as in the Society generally which were referred to the Board of Trustees for report next year. Mr. Farquhar also called attention to the proposed Concours of Roses to be held in Paris in 1917 and 1918, notwithstanding the conditions prevailing in France at the present time. It is desired by the management of the Concours to have five plants of each variety of roses to be grown there for examination until the end of October, 1918. It was voted to refer the matter to the Board of Trustees for such action as it may desire to take with the recommendation that Mr. Farquhar be made chairman of the committee.

On motion of Mr. Wilder, seconded by Mr. David R. Craig, the following vote was adopted:

That the matter of prizes and exhibitions be taken up at the Inaugural Meeting for discussion and action.

At three o'clock Vice President Kidder declared the polls closed and Chairman Wilder of the ballot committee reported the result of the voting as follows:

Whole number of ballots cast 25.

For President, Richard M. Saltonstall received 23.

For Vice President, Nathaniel T. Kidder received 25.

For Trustees, Ernest B. Dane, 24; Andrew W. Preston, 23; Edwin S. Webster, 23; Stephen M. Weld, 22.

For Nominating Committee, William Downs received 24; John K. M. L. Farquhar, 24; Nathaniel T. Kidder, 24; Marcellus A. Patten, 23; William Sim, 25.

Vice President Kidder declared the following named persons to be the duly elected officers of the Society for the year 1917:

President	Richard M. Saltonstall
Vice President (for two years)	Nathaniel T. Kidder
Trustees (for three years)	Ernest B. Dane
	Andrew W. Preston
	Edwin S. Webster
	Stephen M. Weld
Nominating Committee	William Downs
	John K. M. L. Farquhar
	Nathaniel T. Kidder
	Marcellus A. Patten
	William Sim

The meeting was then dissolved.

William P. Rich,
Secretary.

NECROLOGY, 1916.

NECROLOGY, 1916.

William Henry Bowker of Boston, a member of the Society since 1878, died January 4, 1916, at the age of 65. Mr. Bowker was well known among the agricultural interests of New England and was a recognized authority on the subject of fertilizers.

Everett W. Raddin of Cliftondale, Massachusetts, died at Danvers, January 7, 1916, in his 64th year. Mr. Raddin was much interested in the objects of the Society of which he became a member in 1891.

Edgar Howard Doane of Wenham, Massachusetts, a member of the Society since 1902, died January 17, 1916, at an advanced age. He was a great lover of flowers and had a natural aptitude and long experience in cultivating them successfully.

Edward Sturgis Grew of Boston, a member of the Society since 1899, died at West Manchester, January 20, 1916, at the age of 73. Mr. Grew in addition to his many business interests in Boston was also actively interested in philanthropic work in his native city and especially in the objects for the advancement of which this Society was established.

Doctor William Palmer Bolles of Roxbury, Massachusetts, a graduate of the Harvard Medical School of the Class of 1871, died at Santa Barbara, California, March 18, 1916. Doctor Bolles, besides his professional work was much interested in natural history studies. He became a member of the Society in 1875.

John Hopewell of Newton, Massachusetts, died in Washington, D. C., March 28, 1916, in his 71st year. He was admitted a member of the Society in 1913.

Miss Cora Huidekoper Clarke who died in Boston, April 2, 1916, was the daughter of the late Rev. James Freeman Clarke. Miss Clarke was born in Meadville, Pennsylvania, February 9, 1851. She was well known in Boston scientific circles for her interest in natural history studies and in horticulture. She had been a member of the Society since 1871.

Mrs. Henry S. Russell of Milton, Massachusetts, died April 2, 1916. She became a member of the Society in 1914.

Charles W. Ross of Newton, Massachusetts, a member of the Society since 1879, died at his home in that city April 11, 1916, at the age of 67. Mr. Ross, for twenty-five years, was the street Commissioner of Newton.

Albert H. Roffe of Newton, Massachusetts, a member of the Society since 1903, died June 3, 1916.

William G. Peck of Arlington, Massachusetts, died in that town June 16, 1916, at the age of 75 years. He had been a member of the Society since 1871.

N. Allen Lindsey of Marblehead, Massachusetts, died in that town July 1, 1916. He joined the Society in 1904.

George Edward Morris of Waltham, Massachusetts, a member of the Society since 1912, died in that city July 5, 1916, at the age of 63 years. Mr. Morris was interested in natural history researches, especially in mycology, in which he was an authority, and he made a large collection of drawings of fungi and native plants.

Eben Dyer Jordan, one of the best known merchants of Boston, died at his summer home in West Manchester, Massachusetts, August 1, 1916, in his 59th year. He was a man of a wide range of interests in business, music, art, and horticulture. He became a member of the Society in 1899.

JACKSON THORNTON DAWSON of Jamaica Plain, Massachusetts, died at his home there August 3, 1916, in the 75th year of his age. He became a member of the Society in 1872 and throughout the remainder of his life was actively interested in its work. He served as a member of several committees and contributed valuable papers on horticultural subjects which have been published in the Transactions of the Society. In recognition of his ability as a plantsman he was awarded in 1910 the George Robert White Medal of Honor for eminent service in horticulture.

The following tribute to his memory by Mr. Augustus P. Calder of Brookline was presented at the October, 1916, meeting of the Gardeners' and Florists' Club of Boston and is here printed by request. It gives an insight into the character of the man and the regard in which he was held by his associates.

IN MEMORY OF JACKSON THORNTON DAWSON.

During the last summer vacation of our club the unbidden messenger came among us. Again we are called upon to mourn the loss of a dearly beloved member, Jackson Thornton Dawson.

He had been lying upon a bed of sickness but a few days, when, on August 3d last, in the ever changing twilight of a delightful summer afternoon, when all the things of earth, the fields, the woods, the trees, the shrubs and flowers, those heavenly creations that he loved so well, that had been his beloved companions in life, through which in Nature he looked up to Nature's God, were radiant and beautiful, clothed as they were in the royal vestments of Heaven's own exquisite encompassings, he gently fell asleep and his helpful, loving hands were folded forever. Earth that had nourished him and claimed his growth to be restored to earth again and his spirit returned unto God who gave it.

In writing of Jackson Dawson your committee has been confronted by the fact that the plainest and most truthful statements concerning his character and worth would seem to those who did not know him like fulsome flattery. While we would not in these memorial lines transcend the limits of sobriety of thought and expression it yet is difficult to avoid the language of eulogy in voicing truthfully the plain facts of a life that has so commanded the admiration of us all.

Simple justice alone to his memory, justice to the noble profession of which he was so bright and conspicuous an ornament, requires that we bear witness to that which we have seen and heard, as his life has been openly lived before our eyes and against which no dissenting voice is raised.

Mr. Dawson was born in East Riding, Yorkshire, England, in 1841. He came with his mother to this country as a child eight years of age. He started in gardening in the nurseries of his uncle at Andover, Massachusetts. After a few years he went to the Hoveys in Cambridge whose nurseries were then the only great establishment of the kind in the country.

His enlistment in the Civil War interrupted his horticultural studies until his discharge in 1864, after which he again resumed work at Hoveys where he gained much valuable experience which fitted him for higher duties and greater responsibilities. The opportunity soon presented itself and Mr. Dawson accepted a position under Francis Parkman of the School of Horticulture at the Bussey Institution in Jamaica Plain and soon afterward became identified with Professor Charles S. Sargent in the planting and development of the Arnold Arboretum. Many of the trees which are growing there today on its broad acres were reared by him from the seeds and there are oaks which now rise fifty feet high from the acorns he planted.

Mr. Dawson was regarded by horticulturists as one of the world's greatest gardeners and in 1910 was awarded a Medal of Honor by the Massachusetts Horticultural Society, of which he was a member, for having contributed more than any one else to the advancement of horticulture during that year. He was also a member of the Society of American Florists and the Gardeners' and Florists' Club of Boston of which he was president in 1893 and at the time of his death an honorary member.

On December 1st, 1866, Mr. Dawson married Mary McKenna who passed on several years ago. Eight children were born of this union, six of whom survive him. Mr. Dawson was a bright and shining light in the firmament of the horticultural world. In his home life he exemplified the virtues which adorn the faithful loving husband, the affectionate father, and the patriotic citizen. He radiated the brightness of a cheerful disposition and his genial

manner and openhearted way endeared him to all who were privileged to be associated with him. "None knew him but to love him, none named him but to praise."

Fellow members of the Gardeners' and Florists' Club as we face and draw nigh to the summer twilight of our lives, as we brush the dead leaves from our homeward path with the consciousness that the trees from which they fell are still living and will once again bear leaves, so let us think now, not of Jackson Dawson dead but of Jackson Dawson alive with all the fine qualities of his character going on and on into life beautiful and into life eternal.

GEORGE AUGUSTUS GARDNER, an old-time merchant of Boston, died at his home in that city August 6, 1916. He had been connected with the Society since 1895.

PROFESSOR WILLIAM R. LAZENBY, Professor of Horticulture and Forestry in the Ohio State University, Columbus, Ohio, died September 15, 1916. In recognition of his work in horticulture he was elected a Corresponding Member of the Society in 1889.

WILLIAM J. HOYT of Manchester, New Hampshire, a member of the Society since 1905, died at his home in that city, September 26, 1916, in his 70th year.

GEORGE CARTWRIGHT of Roxbury, Massachusetts, died November 2, 1916, at the age of 72. Mr. Cartwright was engaged in the nursery business in Dedham for many years and was well known among the commercial growers of Boston and vicinity. He became a member of the Society in 1885.

CHARLES ABNER CAMPBELL of Ipswich, Massachusetts, a member of the Society since 1908, died November 18, 1916, in his 79th year.

In the later years of his life Mr. Campbell was greatly interested in agricultural and horticultural matters. He was a frequent exhibitor of the products of his farm at Ipswich at the exhibitions of the Society.

LIVINGSTON CUSHING of Weston, Massachusetts, died in New Haven, Connecticut, November 25, 1916, at the age of 61 years. He was admitted a member of the Society in 1895.

Bayard Thayer of Boston, a member of the Society since 1900, died at his residence in Lancaster, Massachusetts, November 29, 1916, at the age of 54. Mr. Thayer was a patron of horticulture and on his estate at Lancaster developed an extensive collection of trees, shrubs, and flowering plants, specimens of which were frequently exhibited at the exhibitions of the Society.

William Crawford Barry of Rochester, New York, president of the Ellwanger & Barry Co. of that city, died December 12, 1916, in his 69th year. Mr. Barry was one of the most widely known horticulturists in the country and for many years was president of the Western New York Horticultural Society. He became a member of the Massachusetts Horticultural Society in 1893.

Mrs. John L. Bremer of Boston, a member of the Society since 1899, died December 12, 1916.

Jerome Jones of Brookline, Massachusetts, prominent in the business activities of Boston, died December 13, 1916, at the age of 79. Mr. Jones became a member of the Society in 1896.

Edward Spaulding of Weston, Massachusetts, a member of the Society since 1864, died December 13, 1916, in his 83d year.

Herbert Jaques of Boston died December 21, 1916, at the age of 59. He was admitted to membership in the Society in 1910.

OFFICERS, COMMITTEES, AND MEMBERS, 1916.

Massachusetts Horticultural Society.

OFFICERS AND STANDING COMMITTEES FOR 1916.

President.

RICHARD M. SALTONSTALL, of Boston.

Vice-Presidents.

WALTER HUNNEWELL, of Boston.
NATHANIEL T. KIDDER, of Milton.

Treasurer.

WALTER HUNNEWELL, of Boston.

Secretary.

WILLIAM P. RICH, of Chelsea.*

Trustees.

THOMAS ALLEN, of Boston.
F. LOTHROP AMES, of North Easton.
GEORGE E. BARNARD, of Ipswich.
ERNEST B. DANE, of Brookline.
WILLIAM C. ENDICOTT, of Boston.
ARTHUR F. ESTABROOK, of Boston.
JOHN K. M. L. FARQUHAR, of Boston.
THOMAS ROLAND, of Nahant.
CHARLES S. SARGENT, of Brookline.
STEPHEN M. WELD, of Wareham.
WILFRID WHEELER, of Concord.
EDWARD B. WILDER, of Dorchester.

Delegate to the State Board of Agriculture.

EDWARD B. WILDER.

Nominating Committee.

ARTHUR F. ESTABROOK
JOHN G. JACK
RICHARD HITTINGER
THOMAS ROLAND
JOHN L. SMITH

* Communications to the Secretary, on the business of the Society, should be addressed to him at Horticultural Hall, Boston.

COMMITTEES FOR 1916.

Finance Committee.

WALTER HUNNEWELL, *Chairman.*
ARTHUR F. ESTABROOK, STEPHEN M. WELD.

Membership Committee.

RICHARD M. SALTONSTALL.
THOMAS ALLEN, THOMAS ROLAND.

Committee on Library.

CHARLES S. SARGENT, *Chairman.*
ERNEST B. DANE, NATHANIEL T. KIDDER.

Committee on Lectures and Publications.

WILFRID WHEELER, *Chairman.*
JOHN K. M. L. FARQUHAR, F. C. SEARS.
FRED A. WILSON.

Committee on Prizes and Exhibitions.

JAMES WHEELER, *Chairman.*
JOHN K. M. L. FARQUHAR, DUNCAN FINLAYSON,
T. D. HATFIELD, A. H. WINGETT.

Committee on Plants and Flowers.

WILLIAM ANDERSON, *Chairman.*
ARTHUR H. FEWKES, S. J. GODDARD, DONALD McKENZIE,
WILLIAM SIM.

Committee on Fruits.

EDWARD B. WILDER, *Chairman.*
WILLIAM DOWNS, RALPH W. REES.

Committee on Vegetables.

JOHN L. SMITH, *Chairman.*
HENRY M. HOWARD, WILLIAM C. RUST.

Committee on Gardens.

RICHARD M. SALTONSTALL, *Chairman.*
DAVID R. CRAIG, JACKSON T. DAWSON,
WILLIAM NICHOLSON, CHARLES SANDER.

Committee on Children's Gardens.

HENRY S. ADAMS, *Chairman.*
DR. HARRIS KENNEDY, MRS. W. RODMAN PEABODY,
MISS MARGARET A. RAND, JAMES WHEELER.

MEMBERS OF THE MASSACHUSETTS HORTICULTURAL SOCIETY, 1916.

Revised to December 31, 1916.

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 lists are inaccurate in any particular, will confer a favor by promptly communicating to the Secretary the needed corrections.

1900 Dr. Henry S. Pritchett, Washington, D. C.
1900 Albert Viger, President of the National Society of Horticulture of France, Paris.
1897 Hon. James Wilson, Ex-Secretary of Agriculture, Washington, D. C.

CORRESPONDING MEMBERS.

1901 George Francis Atkinson, Professor of Botany in Cornell University, Ithaca, N. Y.
1889 Dr. L. H. Bailey, Ithaca, N. Y.
1898 John Gilbert Baker, F. R. S., F. L. S., Kew, England.
1875 Professor William J. Beal, Amherst, Mass.
1911 W. J. Bean, Royal Gardens, Kew, England.
1911 John Dunbar, Park Department, Rochester, N. Y.
1887 Sir W. T. Thiselton Dyer, K. C. M. G., F. R. S., "Witcombe," Gloucester, England.
1875 Parker Earle, President of the American Horticultural Society, Roswell, N. M.
1887 H. J. Elwes, F. R. S., Colesborne, Cheltenham, England.

1889 William G. Farlow, M. D., Professor of Cryptogamic Botany, Harvard University, Cambridge, Mass.
1893 B. E. Fernow, University of Toronto, Ontario.
1900 Dr. Beverly T. Galloway, Department of Agriculture, Washington, D. C.
1877 George Lincoln Goodale, M. D., Cambridge, Mass.
1895 Professor Byron D. Halsted, Botanist at the New Jersey Agricultural Experiment Station, New Brunswick, N. J.
1914 C. S. Harrison, York, Nebraska.
1911 Professor U. P. Hedrick, New York Agricultural Experiment Station, Geneva, N. Y.
1907 Augustine Henry, F. L. S., M. R. I. A., Professor of Forestry, Royal College of Science, Dublin, Ireland.
1897 J. W. Hoffmann, Colored State University, Orangeburg, S. C.
1906 Senor Don Salvador Izquierdo, Santiago, Chile.
1911 Émile Lemoine, Nancy, France.
1875 T. C. Maxwell, Geneva, N. Y.
1911 J. Ewing Mears, M. D., Philadelphia, Pa.
1911 Wilhelm Miller, Superintendent of Horticulture, University of Illinois, Urbana, Illinois.
1898 Sir Frederick W. Moore, Curator of the Royal Botanic Gardens, Glasnevin, Dublin, Ireland.
1887 Sir Daniel Morris, C. M. G., D.Sc., M. A., F. L. S.
1898 Peter Nφvik, Secretary of the Norwegian Horticultural Society, Christiania, Norway.
1912 C. Harman Payne, London, England.
1906 Sir David Prain, C. I. E., C. M. G., F. R. S., Director of the Royal Botanic Gardens, Kew, England.
1894 Cavalière Enrico Ragusa, Palermo, Sicily.
1906 Dr. Henry L. Ridley, C. M. G., F. R. S., Kew, England.
1898 Benjamin Lincoln Robinson, Ph.D., Curator of the Gray Herbarium of Harvard University, Cambridge, Mass.
1875 William Robinson, London, England.
1899 William Salway, Superintendent of Spring Grove Cemetery Cincinnati, O.
1875 Robert W. Starr, Wolfville, N. S.
1893 Professor William Trelease, University of Illinois, Urbana, Illinois.
1882 H. J. Veitch, Chelsea, England.
1905 Maurice L. de Vilmorin, Paris, France.
1905 Philippe L. de Vilmorin, Paris, France.
1912 Professor Hugo de Vries, University of Amsterdam, Amsterdam, Holland.
1894 William Watson, Curator of Royal Botanic Gardens, Kew, England.

1906 Miss E. Willmott, Essex, England.
1911 E. H. Wilson, Jamaica Plain, Mass.
1901 Professor L. Wittmack, Secretary of the Royal Prussian Horticultural Society, Berlin, Prussia.

LIFE MEMBERS.

1899 Adams, Mrs. Charles Francis, South Lincoln.
1907 Adams, George E., Kingston, R. I.
1897 Adams, Henry Saxton, Jamaica Plain.
1899 Agassiz, Mrs. George R., Yarmouth Port.
1894 Allen, Hon. Charles H., Lowell.
1916 Allen, Edward Ellis, Watertown.
1905 Allen, Mrs. Sarah R., Wilmington.
1898 Allen, Thomas, Boston.
1899 Ames, F. Lothrop, North Easton.
1914 Ames, Mrs. F. L., North Easton.
1899 Ames, John S., North Easton.
1894 Ames, Oakes, North Easton.
1899 Ames, Oliver, North Easton.
1900 Ames, Mrs. Oliver, Sr., North Easton.
1867 Amory, Frederic, Boston.
1899 Anderson, Larz, Brookline.
1911 Anderson, William, South Lancaster.
1864 Andrews, Charles L., Milton.
1871 Appleton, Hon. Francis H., Boston.
1914 Appleton, Francis R., New York, N. Y.
1913 Appleton, Henry Saltonstall, Boston.
1914 Apthorp, Mrs. Harrison O., Milton.
1900 Arnold, Mrs. George Francis, Brookline.
1894 Ash, John, Pomfret Centre, Conn.
1890 Atkins, Edwin F., Belmont.
1914 Ayer, Mrs. Frederick, Boston.
1899 Ayer, James B., Boston.

1912 Bache, James S., Sharon, Conn.
1905 Backer, Clarence A., Melrose.
1914 Bacon, Miss E. S., Jamaica Plain.
1905 Badger, Walter I., Cambridge.
1894 Bailey, Jason S., West Roxbury.
1902 Bailey, Robert M., Dedham.
1902 Baker, Clifton P., Dedham.
1901 Baker, James E., South Lincoln.
1904 Balch, Joseph, Dedham.
1909 Baldwin, Frank F., Hopkinton.
1888 Barber, J. Wesley, Newton.
1904 Barker, George, Swampscott.
1905 Barnard, George E., Ipswich.
1866 Barnes, Walter S., Brookline.
1904 Barney, Arthur F., Dorchester.
1867 Barney, Levi C., Boston.
1897 Barry, John Marshall, Boston.
1901 Bartlett, Miss Mary F., Boston.
1914 Bartol, Dr. John W., Boston.
1915 Bartsch, Hermann H., Waverley.
1901 Bates, Miss Mary D., Ipswich.
1915 Bauernfeind, John, Medford.
1899 Baylies, Walter C., Taunton.
1914 Beal, Mrs. Boylston, Boston.
1905 Beal, Thomas P., Boston.
1891 Becker, Frederick C., Cambridge.
1876 Beckford, Daniel R., Jr., Dedham.
1894 Beebe, E. Pierson, Boston.

1890 Beebe, Franklin H., Boston.
1905 Bemis, Frank B., Beverly.
1914 Bemis, Mrs. Frank B., Beverly.
1899 Bigelow, Albert S., Cohasset.
1914 Bigelow, Charles, Brookline.
1899 Bigelow, Joseph S., Cohasset.
1899 Bigelow, Dr. William Sturgis, Boston.
1899 Black, George N., Manchester.
1885 Blake, Mrs. Arthur W., Brookline.
1914 Blake, Benjamin S., Auburndale.
1897 Blake, Edward D., Boston.
1908 Blood, Eldredge H., Swampscott.
1905 Boardman, Miss Eliza D., Boston.
1899 Boardman, T. Dennie, Manchester.
1914 Boit, Miss Elizabeth E., Wakefield.
1894 Bosler, Frank C.,Carlisle, Penn.
1914 Bowditch, Alfred, Jamaica Plain.
1887 Bowditch, Charles P., Jamaica Plain.
1897 Bowditch, Ernest W., Milton.
1883 Bowditch, James H., Brookline.
1894 Bowditch, Nathaniel I., Framingham.
1877 Bowditch,William E., Roxbury.
1913 Brackett, C. Henry B., Boston.
1912 Bradley, Charles H., Boston.
1914 Brandegee, Mrs. Edward D., Brookline.
1900 Breck, Joseph Francis, Waban.
1914 Breck, Luther Adams, Newton.
1871 Bresee, Albert, Hubbardton, Vt.
1914 Brewer, Edward M., Milton.
1914 Brewer, Joseph, Milton.
1905 Brewster, William, Cambridge.
1910 Briggs, Mrs. George R., Plymouth.
1897 Briggs, William S., Lincoln.
1873 Brigham, William T., Honolulu, Hawaii.
1909 Brooke, Edmund G., Jr., Providence, R. I.
1914 Brooks, Miss Fanny, Readville.
1914 Brooks, Henry G., Milton.
1899 Brooks, Peter C., Boston.
1899 Brooks, Shepherd, Boston.
1912 Brooks, Walter D., Milton.
1909 Brown, Mrs. John Carter, Providence, R. I.
1907 Brush, Charles N., Brookline.
1915 Buckminster, W. B., Malden.
1906 Buitta, Vincent, Newton Upper Falls.
1914 Bullard, Alfred M., Milton.
1897 Burlen, William H., East Holliston.
1895 Burnett, Harry, Southborough.
1911 Burnett, John T., Southborough.
1914 Burnett, Robert M., Southborough.
1914 Burnham, Miss Helen C., Boston.
1909 Burr, I. Tucker, Milton.
1906 Burrage, Albert C., Boston.
1868 Butler, Aaron, Wakefield.
1907 Butterworth, George William, South Framingham.
1906 Butterworth, J. Thomas, South Framingham.
1905 Buttrick, Stedman, Concord.

1902 Cabot, George E., Boston.
1914 Cabot, Henry B., Brookline.
1870 Calder, Augustus P., Brookline.
1896 Cameron, Robert, Cambridge.
1913 Campbell, Chester I., Wollaston.
1891 Campbell, Francis, Cambridge.
1905 Carr, Samuel, Boston.
1893 Carter, Charles N., Needham.
1899 Casas, W. B. de las, Malden.
1911 Case, Miss Marian Roby, Weston.

1873 Chamberlain, Chauncy W., Waban.
1909 Chamberlain, Montague, Groton.
1903 Chapman, John L., Prides Crossing.
1878 Chase, Joseph S., Malden.
1909 Chase, Philip Putnam, Milton.
1895 Cheney, Mrs. Elizabeth S., Wellesley.
1894 Christie, William, Everett.
1876 Clapp, Edward B., Dorchester.
1871 Clapp, William C., Dorchester.
1896 Clark, B. Preston, Cohasset.
1896 Clark, Miss Eleanor J., Pomfret Centre, Conn.
1907 Clark, Herbert A., Belmont.
1890 Clark, J. Warren, Millis.
1910 Clark, Winslow, Milton.
1899 Clarke, Eliot C., Boston.
1914 Clifford, Charles P., Milton.
1895 Clough, Micajah Pratt, Lynn.
1894 Cobb, John C., Milton.
1914 Cochrane, Alexander, Boston.
1906 Codman, Miss Catherine A., Westwood.
1871 Codman, James M., Brookline.
1914 Codman, James M., Jr., Brookline.
1901 Coe, Miss Mary Alma, Boston.
1903 Cogswell, Edward R., Jr., Newton Highlands.
1900 Cole, Edward E., Boston.
1882 Collins, Frank S., North Eastham.
1914 Collins, William J., Brookline.
1902 Comley, Norris F., Lexington.
1899 Converse, Col. H. E., Marion.
1913 Cook, Thomas N., Watertown.
1914 Coolidge, Charles A., Boston.
1902 Coolidge, Harold J., Boston.
1899 Coolidge, J. Randolph, Chestnut Hill.
1899 Coolidge, Mrs. J. Randolph, Chestnut Hill.
1914 Cotting, Charles E., Boston.
1914 Cotting, Mrs. Charles E., Boston.
1892 Cottle, Henry C., Boston.
1914 Councilman, Dr. W. T., Boston.
1913 Cox, Simon F., Mattapan.
1892 Cox, Thomas A., Dorchester.
1914 Crafts, Miss Elizabeth S., Boston.
1910 Craig, David R., Boston.
1901 Craig, William Nicol, Brookline.
1899 Crane, Zenas, Dalton.
1891 Crawford, Dr. Sarah M., Roxbury.
1891 Crocker, Miss Sarah H., Boston.
1914 Crompton, Miss Isabel M., Worcester.
1887 Crosby, George E., West Medford.
1914 Crosby, Mrs. S. V. R., Boston.
1901 Cross, Alfred Richard, North Cohasset.
1909 Cumner, Mrs. Nellie B., Brookline.
1856 Curtis, Charles F., Jamaica Plain.
1899 Curtis, Charles P., Boston.
1906 Cutler, Mrs. Charles F., Boston.
1903 Cutler, Judge Samuel R., Revere.

1897 Damon, Frederick W., Arlington.
1908 Dane, Ernest B., Brookline.
1908 Dane, Mrs. Ernest B., Brookline.
1899 Daniels, Dr. Edwin A.. Boston.
1909 Danielson, Mrs. J. DeForest, Boston.
1892 Davenport, Albert M., Watertown.
1902 Davis, Arthur E., Dover.
1902 Davis, Mrs. Arthur E., Dover.
1913 Davis, Bancroft Chandler, Weston.
1916 Davis, Miss Helen I., Wellesley.
1914 Davis, Livingston, Milton.

1909 Dawson, Henry Sargent, Jamaica Plain.
1905 Day, Henry B., West Newton.
1873 Denny, Clarence H., Boston.
1904 Dexter, Gordon, Beverly Farms.
1904 Dexter, Philip, Beverly.
1866 Dike, Charles C., Stoneham.
1896 Donald, William, Cold Spring Harbor, N. Y.
1900 Donaldson, James, Roxbury.
1907 Doten, Scott T., Lincoln.
1914 Douglass, Alfred, Brookline.
1910 Downs, William, Chestnut Hill.
1893 Dowse, William B. H., West Newton.
1899 Draper, George A., Hopedale.
1896 Dreer, William F., Philadelphia, Pa.
1897 Dumaresq, Herbert, Chestnut Hill.
1899 Duncan, James L., New York, N. Y.
1902 Duncan, John W., Spokane, Wash.
1896 Dunlap, James H., Nashua, N. H.
1915 Dunn, Stephen Troyte, F. L. S., F. R. G. S., Kew, England.
1915 Dupee, William Arthur, Milton.
1909 Dupuy, Louis, Whitestone, L. I., N. Y.
1852 Durfee, George B., Fall River.
1880 Dutcher, Frank J., Hopedale.
1900 Dwight, Theodore F., Kendal Green.
1902 Dyer, Herbert H., Arlington.
1912 Eaton, Harris D., Southborough.
1911 Edgar, Mrs. Rose H., Waverley.
1912 Edgar, William Percival, Jamaica Plain.
1895 Eldredge, H. Fisher, Boston.
1887 Elliott, Mrs. John W., Boston.
1888 Elliott, William H., Brighton.
1903 Ellsworth, J. Lewis, Worcester.
1907 Emerson, Nathaniel W., M.D., Boston.
1894 Endicott, William, Boston.
1899 Endicott, William C., Danvers.
1915 Ernst, Mrs. Harold C., Jamaica Plain.
1897 Estabrook, Arthur F., Boston.
1905 Estabrook, Mrs. Arthur F., Boston.
1907 Eustis, Miss Elizabeth M., Brookline.
1907 Eustis, Miss Mary St. Barbe, Brookline.
1914 Evans, Mrs. Robert D., Boston.
1915 Fairbanks, Charles F., Milton.
1881 Fairchild, Charles, New York, N. Y.
1877 Falconer, William, Pittsburg, Pa.
1884 Farlow, Lewis H., Boston.
1896 Farnsworth, Mrs. William, Dedham.
1890 Farquhar, James F. M., Roslindale.
1891 Farquhar, John K. M. L., Roxbury.
1915 Farquhar, Mrs. John K. M. L., Roxbury.
1884 Farquhar, Robert, North Cambridge.
1873 Faxon, John, Quincy.
1899 Fay, H. H., Woods Hole.
1915 Fay, Mrs. Harry F., Lexington.
1908 Fay, Wilton B., West Medford.
1914 Fearing, George R., Jr., Boston.
1899 Fessenden, George B., Allston.
1883 Fewkes, Arthur H., Newton Highlands.
1904 Finlayson, Duncan, Jamaica Plain.
1892 Finlayson, Kenneth, Jamaica Plain
1901 Fisher, Peter, Ellis.
1910 Flanagan, Joseph F., Newton.
1882 Fletcher, George V., Belmont.
1883 Fletcher J. Henry, Belmont.
1914 Forbes, Alexander, M.D., Milton.

1909 Forbes, Charles Stewart, Boston.
1909 Forbes, Mrs. J. Malcolm, Milton.
1914 Forbes, W. Cameron, Westwood.
1909 Forbes, Mrs. William H., Milton.
1914 Foster, Alfred D., Milton.
1899 Foster, Charles H. W., Needham.
1885 Fottler, John, Jr., Dorchester.
1881 Fowle, George W., Jamaica Plain.
1914 Fraser, Charles E. K., South Natick.
1911 Freeman, Mrs. James G., Boston.
1910 French, Mrs. Albert M., Reading.
1892 French, S. Waldo, Newtonville.
1893 French, W. Clifford, Brookline.
1882 Frohock, Roscoe R., Boston.
1903 Frost, Harold L., Arlington.
1900 Frost, Irving B., Belmont.
1899 Frothingham, Mrs. Louis A., Boston.

1910 Galloupe, Frederic R., Lexington.
1914 Gannett, Samuel, Milton.
1914 Gardiner, Robert H., Gardiner, Maine.
1901 Gardner, Mrs. Augustus P., Hamilton.
1895 Gardner, George P., Boston.
1899 Gardner, John L., Boston.
1899 Gardner, Mrs. John L., Brookline.
1899 Gardner, William Amory, Groton.
1910 Garland, Mrs. Marie T., Buzzards Bay.
1904 Garratt, Allan V., Holliston.
1899 Gaston, William A., Boston.
1911 Gavin, Frank D., Manchester.
1910 Geiger, Albert, Jr., Brookline.
1911 Gill, Miss Adeline Bradbury, Medford.
1911 Gill, Miss Eliza M., Medford.
1865 Gill, Mrs. E. M.. Medford.
1887 Gill, George B., Medford.
1870 Gilson, F. Howard, Wellesley Hills.
1907 Goddard, Samuel J., Framingham.
1904 Goodale, Dr. Joseph L., Boston.
1885 Goodell, L. W., Dwight.
1899 Gray, Mrs. John C., Boston.
1914 Greene, Edwin Farnham, Boston.
1905 Greenough, Mrs. Charles P., Brookline.
1912 Greenough, Mrs. David S., Jamaica Plain.
1914 Grew, Mrs. Edward S., Boston.
1914 Grew, Edward W., Boston.

1897 Hale, James O., Byfield.
1873 Hall, Edwin A., Cambridgeport.
1912 Hall, Mrs. George G., Boston
1899 Hall, Jackson E., Cambridge.
1897 Hall, Osborn B., Malden.
1910 Halloran, Edward J., Roxbury.
1913 Handler, Max Paul, South Natick.
1914 Harding, Charles L., Dedham.
1863 Harding, George W., Arlington.
1869 Harding, Louis B., Chestnut Hill.
1871 Hardy, F. D., Cambridgeport.
1905 Hardy, Miss Susan White, Boston.
1889 Hargraves, William J., Jamaica Plain.
1887 Harris, Thaddeus William, A. M., Littleton, N. H.
1910 Harris, Prof. William Fenwick, Cambridge.
1909 Hart, Francis R., Milton.
1899 Hartshorn, Arthur E., Worcester.
1914 Hartt, Arthur W., Brookline.
1895 Harwood, George Fred, Newton.
1884 Hastings, Levi W., Brookline.

1906 Hauthaway, Edwin D., Sharon.
1914 Havemeyer, Theodore A., New York, N. Y.
1891 Hawken, Mrs. Thomas, Rockland, Me.
1899 Hayward, George P., Chestnut Hill.
1914 Haywood, H. T., Franklin.
1905 Head, Thomas W., Lake Forest, Ill.
1913 Heeremans, F., Lenox.
1903 Hellier, Charles E., Boston.
1888 Hemenway, Augustus, Canton.
1899 Hemenway, Mrs. Augustus, Canton.
1914 Hemenway, Augustus, Jr., Boston.
1884 Henshaw, Joseph P. B., Boston.
1899 Henshaw, Samuel, Cambridge.
1901 Heurlin, Julius, South Braintree.
1894 Hewett, Miss Mary Crane, Cambridge.
1900 Higginson, Francis L., Boston.
1902 Higginson, Mrs. Henry L., Boston.
1866 Hilbourn, A. J. Boston.
1886 Hittinger, Jacob, Belmont.
1911 Hittinger, Richard, Belmont.
1895 Hoitt, Hon. Charles W., Nashua, N. H.
1905 Holbrook, E. Everett, Boston.
1914 Hollingsworth, Valentine, Boston.
1899 Hollingsworth, Z. T., Boston.
1881 Hollis, George W., Allston.
1891 Holmes, Edward J., Boston.
1876 Holt, Mrs. Stephen A., Cambridge.
1900 Holt, William W., Norway, Maine.
1899 Hood, The Hon. Mrs. Ellen, Sheen, Surrey, Eng.
1914 Hornblower, Henry, Boston.
1888 Horsford, Miss Kate, Cambridge.
1912 Horton, Arthur E., Lexington.
1902 Hosmer, Oscar, Wenham.
1907 Houghton, Clement S., Chestnut Hill.
1910 Houghton, Miss Elizabeth G., Boston.
1872 Hovey, Charles H., South Pasadena, Cal.
1884 Hovey, Stillman S., Woburn.
1904 Howard, Henry M., West Newton.
1896 Howard, Joseph W., Somerville.
1915 Howes, Mrs. Ernest, Boston.
1896 Hubbard, Charles Wells, Weston.
1865 Hubbard, James C., Everett.
1913 Huebner, H., Groton.
1875 Humphrey, George W., Dedham.
1912 Hunnewell, F. W., 2d., Wellesley.
1893 Hunnewell, Henry Sargent, Wellesley.
1912 Hunnewell, Mrs. Henry S., Wellesley.
1882 Hunnewell, Walter, Wellesley.
1912 Hunnewell, Walter, Jr., Wellesley.
1892 Hunt, Dudley F., Reading.
1866 Hunt, Franklin, Charlestown, N. H.
1880 Hunt, William H., Concord.
1904 Hutchins, Rev. Charles Lewis, Concord.

1893 Jack, John George, East Walpole.
1886 Jackson, Charles L., Boston.
1914 Jackson, Mrs. James, Jr., Westwood.
1884 Jackson, Robert T., Peterborough, N. H.
1916 Jahn, Paul H., East Bridgewater.
1916 Jahn, William O., East Bridgewater.
1902 James, Ellerton, Milton.

1902 James, Mrs. Ellerton, Milton.
1899 James, George Abbot, Nahant.
1913 Jeffries, John Temple L., Cambridge.
1899 Jeffries, William A., Boston.
1865 Jenks, Charles W., Bedford.
1905 Johnson, Arthur S., Boston.
1914 Johnson, Edward C., Boston.
1885 Johnson, J. Frank, Malden.
1907 Jones, Mrs. Clarence W., Brookline.
1897 Jones, Dr. Mary E., Boston.
1900 Jordan, Henry G., Hingham Centre.

1897 Kellen, William V., Marion.
1886 Kelly, George B., Jamaica Plain.
1848 Kendall, D. S., Woodstock, Ont.
1891 Kendall, Dr. Walter G., Atlantic.
1868 Kennedy, George G., M. D., Milton.
1909 Kennedy, Harris, M. D., Milton.
1905 Keyes, Mrs. Emma Mayer, Boston.
1891 Keyes, John M., Concord.
1889 Kidder, Charles A., Southborough.
1910 Kidder, Mrs. Henry P., Boston.
1880 Kidder, Nathaniel T., Milton.
1899 Kimball, David P., Boston.
1903 Kimball, Richard D., Waban.
1899 King, D. Webster, Boston.
1865 Kingman, Abner A., Wakefield.
1899 Kinney, H. R., Worcester.
1906 Kinnicutt, Mrs. Leonard P., Worcester.
1904 Kirkland, Archie Howard, Reading.

1899 Lamb, Horatio A., Milton.
1913 Lancaster, Dr. Walter B., Brookline.
1899 Lanier, Charles, Lenox.
1895 Lawrence, Amos A., New York, N. Y.
1873 Lawrence, John, Groton.
1899 Lawrence, Rt. Rev. William, Boston.
1895 Lee, Daniel D., Jamaica Plain.
1914 Lee, George C., Westwood.
1914 Lee, Mrs. George C., Westwood.
1880 Leeson, Hon. Joseph R., Newton Centre.
1902 Leighton, George B., Monadnock, N. H.
1914 Leland, Lester, Boston.
1914 Leland, Mrs. Lester, Boston.
1871 Lemme, Frederick, Charlestown.
1903 Libby, Charles W., Medford.
1899 Little, John Mason, Swampscott.
1899 Locke, Isaac H., Belmont.
1891 Lodge, Richard W., Redlands, Cal.
1897 Loomis, Elihu G., Bedford.
1899 Loring, Augustus P., Beverly.
1905 Loring, David, Boston.
1914 Loring, Miss Katharine P., Prides Crossing.
1914 Loring, Miss Louisa P., Prides Crossing.
1899 Loring, Mrs. William Caleb, Beverly.
1899 Lowell, Abbott Lawrence, Boston.
1902 Lowell, Miss Amy, Brookline.
1903 Lowell, James A., Chestnut Hill.
1903 Lowell, John, Newton.
1904 Lowell, Miss Lucy, Boston.
1899 Luke, Otis H., Brookline.
1895 Lunt, William W., Hingham.
1914 Lyman, C. Frederic, Boston.
1895 Lyman, George H., Wareham.

1898 Mabbett, George, Plymouth.
1912 MaKay, Alexander, Jamaica Plain.

1911 McKenzie, Donald, Chestunt Hill.
1868 Mahoney, John, Boston.
1892 Mallett, E. B., Jr., Freeport, Me.
1884 Manda, W. A., South Orange, N. J.
1906 Mandell, Mrs. William D., Boston.
1873 Mann, James F., Ipswich.
1887 Manning, J. Woodward, Reading.
1884 Manning, Warren H., Brookline.
1909 Marlborough, James, Topsfield.
1913 Marshall, A. A., Fitchburg.
1876 Marshall, Frederick F., Everett.
1898 Marston, Howard, Brookline.
1899 Mason, Miss Ellen F., Boston.
1896 Mason,Col. Frederick,Taunton.
1914 Mathews, Miss Elizabeth Ashby, Newton Center.
1901 Matthews, Nathan, Boston.
1906 Maxwell, George H., Newton.
1902 Melvin, George, South Framingham.
1905 Meredith, J. Morris, Topsfield.
1881 Merriam, Herbert, Weston.
1884 Metivier, James, Waltham.
1914 Meyer, George von L., Hamilton.
1914 Mifflin, George H., Boston.
1914 Miller, Peter M., Mattapan.
1888 Milmore, Mrs. Joseph, Washington, D. C.
1915 Minot, Mrs. Charles S., Readville.
1908 Minot, Laurence, Boston.
1892 Monteith, David, Hyde Park, Vt.
1896 Montgomery, Alexander, Natick.
1902 Montgomery, Alexander, Jr., Natick.
1896 Moore, George D., Arlington.
1881 Moore, John H., Concord.
1897 Morgan, George H., New York, N. Y.
1914 Morgan, Mrs. J. P., New York, N. Y.
1913 Morison, Robert S., Cambridge.
1899 Morse, John T., Boston.
1909 Morse, John Torrey, 3d., Boston.
1910 Morse, Lewis Kennedy, Boxford.
1913 Morse, Robert C., Milton.
1900 Morse, Robert M., Jamaica Plain.
1914 Morss, Charles A., Chestnut Hill.
1914 Morss, Mrs. Charles A., Chestnut Hill.
1902 Morton, James H., Huntington, N. Y.
1896 Moseley, Charles H., Roxbury.
1909 Moseley, Charles W., Newburyport.
1896 Moseley, Frederick Strong, Newburyport.
1914 Munroe, Howard M., Lexington.
1900 Murray, Peter, Fairhaven.
1897 Mutch, John, Waban.

1899 Nevins, Mrs. David, Methuen.
1914 Newbold, Frederic R., New York, N. Y.
1874 Newman, John R., Winchester.
1874 Newton, Rev. William W., Pittsfield.
1914 Nicholson, William R., Framingham.
1906 Nickerson, William E., Cambridge.
1914 Norman, Mrs. Louisa P., Newport, R. I.
1881 Norton, Charles W., Allston.
1891 Norton, Edward E., Boston.

1912 O'Conner, John, Brookline.

1898 Olmsted, Frederick Law, Jr., Brookline.
1892 Olmsted, John C., Brookline.
1898 Orpet, Edward O., Lake Forest, Ill.

1909 Page, George, Newton Highlands.
1909 Page, George William, South Lincoln.
1900 Page, Mrs. Henrietta, Cambridge.
1884 Paige, Clifton H., Mattapan.
1914 Paine, Robert Treat, 2d, Boston.
1908 Parker, Augustine H., Dover.
1913 Parker, Edgar, North Easton.
1911 Parker, Edward, North Easton.
1915 Parker, Miss Eleanor S., Bedford.
1891 Parkman, Henry, Boston.
1899 Parsons, John E., Lenox.
1914 Patten, Miss Jane B., South Natick.
1897 Patten, Marcellus A., Tewksbury.
1909 Peabody, Francis, Milton.
1909 Peabody, Mrs. Francis, Milton.
1905 Peabody, Frank E., Boston.
1899 Peabody, George A., Danvers.
1881 Peabody, John E., Salem.
1907 Peirce, E. Allan, Waltham.
1916 Peirce, Edward R., Wellesley Farms.
1914 Peirson, Charles Lawrence, Boston.
1915 Penn, Henry, Brookline.
1899 Pentecost, Mrs. Ernest Harvey, Topsfield.
1873 Perry, George W., Malden.
1899 Pfaff, Col. Charles, South Framingham.
1900 Phillips, John C., North Beverly.
1899 Phillips, Mrs. John C., North Beverly.
1899 Phillips, William, North Beverly.
1895 Pickman, Dudley L., Boston.
1902 Pickman, Mrs. Ellen R., Boston.
1881 Pierce, Dean, Brookline.
1892 Pierce, George Francis, Neponset.
1905 Pierce, Wallace L., Boston.
1905 Pierson, Frank R., Tarrytown, N. Y.
1914 Pingree, David, Salem.
1900 Pond, Preston, Winchester.
1892 Porter, James C., Wollaston.
1884 Pratt, Laban, Dorchester.
1868 Pratt, Robert M., Boston.
1914 Pratt, .Waldo E., Wellesley Hills.
1898 Pray, James Sturgis, Cambridge.
1899 Prendergast, James M., Boston.
1858 Prescott, Eben C., New York, N. Y.
1914 Preston, Andrew W., Swampscott.
1903 Preston, Howard Willis, Providence, R. I.
1911 Priest, Lyman F., Gleasondale.
1912 Proctor, Henry H., Boston.
1901 Proctor, Thomas E., Boston.
1899 Putnam, George, Manchester.
1900 Putnam, George J., Brookline.

1886 Quimby, Hosea M., M. D., Worcester.

1889 Rand, Harry S., North Cambridge.
1908 Rand, Miss Margaret A., Cambridge.
1903 Rawson, Herbert W., Arlington.
1882 Ray, James F., Franklin.
1890 Raymond, Walter, Pasadena, Cal.
1891 Read, Charles A., Manchester.
1902 Reardon, Edmund, Cambridgeport.

1892 Reardon, John B., Boston.
1912 Reiff, William, Forest Hills.
1905 Remick, Frank W., West Newton.
1889 Rice, George C., Worcester.
1887 Rich, William P., Chelsea.
1876 Richards, John J., Brookline.
1899 Richardson, Mrs. F. L. W., Charles River Village.
1912 Richardson, H. H., Brookline.
1900 Richardson, Dr. William L., Boston.
1905 Riggs, William Allan, Auburndale.
1886 Ripley, Charles, Dorchester.
1892 Ripley, Ebed L., Hingham Centre.
1903 Robb, Russell, Concord.
1909 Roberts, Miss Anna B., Boston.
1909 Robinson, Alfred E., Lexington.
1871 Robinson, John, Salem.
1900 Rodman, Miss Mary, Concord.
1903 Roffe, Albert H., Newton Centre.
1911 Rogers, Dexter M., Allston.
1914 Rogers, Dudley P., Danvers.
1899 Rogers, Mrs. Jacob C., Peabody.
1900 Roland, Thomas, Nahant.
1910 Ross, Harold S., Hingham.
1895 Rothwell, James E., Brookline.
1899 Roy, David Frank, Marion.
1881 Ruddick, William H., M. D., South Boston.
1875 Russell, George, Woburn.
1900 Russell, James S., Milton.
1914 Russell, Mrs. Robert S., Boston.

1893 Salisbury, William C. G., Brookline.
1915 Saltonstall, Mrs. Caroline S., Milton.
1912 Saltonstall, John L., Beverly.
1912 Saltonstall, Mrs. John L., Beverly.
1899 Saltonstall, Richard M., Chestnut Hill.
1898 Sanger, Mrs. George P., Boston.
1900 Sargent, Andrew Robeson, Brookline.
1870 Sargent, Charles S., Brookline.
1899 Sargent, Mrs. Charles S., Brookline.
1902 Sargent, Charles Sprague, Jr., Brookline.
1899 Sargent, Mrs. Francis W., Wellesley.
1896 Scorgie, James C., Cambridge.
1864 Scott, Charles, Newton.
1895 Sears, Miss Clara E., Boston.
1899 Sears, Dr. Henry F., Boston.
1914 Sears, Horace S., Weston.
1899 Sears, Mrs. J. Montgomery, Boston.
1898 Sharp, Miss Helen, Boston.
1914 Shattuck, Dr. Frederick C., Boston.
1914 Shattuck, Mrs. Frederick C., Boston.
1899 Shaw, Francis, Wayland.
1914 Shaw, Henry S., Milton.
1899 Shaw, Mrs. Robert G., Wellesley.
1901 Shea, James B., Jamaica Plain.
1906 Sherman, J. P. R., Newton.
1865 Shorey, John L., Lynn.
1892 Shuman, Hon. A., Boston.
1901 Shurtleff, Josiah B., Revere.
1893 Siebrecht, H. A., New Rochelle, N. Y.
1899 Sleeper, Henry Davis, Boston.
1903 Smiley, Daniel, Lake Mohonk, N. Y.
1888 Smith, Charles S., Lincoln.
1872 Smith, Edward N., San Francisco, Cal.
1911 Smith, John L., Swampscott.
1888 Smith, Thomas Page, Waltham.
1874 Snow, Eugene A., Cambridge.
1899 Sohier, Col. William D., Beverly.

1908 Spaulding, John T., Prides Crossing.
1908 Spaulding, William S., Prides Crossing.
1897 Sprague, Isaac, Wellesley Hills.
1884 Stearns, Charles H., Brookline.
1893 Stearns, Frank W., Newton.
1896 Stedman, Henry R., M. D., Brookline.
1914 Stevens, Mrs. Nathaniel, North Andover.
1885 Stewart, William J., Winchester.
1901 Stone, Charles A., Newton.
1889 Stone, Charles W., Boston.
1910 Stone, Mrs. Francis H., South Dartmouth.
1914 Stone, Galen L., Brookline.
1896 Stone, Prof. George E., Amherst.
1849 Stone, George F., Chestnut Hill.
1914 Stone, J. Winthrop, Watertown.
1914 Stone, Nathaniel H., Milton.
1905 Storrow, James J., Boston.
1905 Stratton, Charles E., Boston.
1906 Strout, Charles S., Biddeford, Me.
1914 Sturgis, Miss Evelyn R., Manchester.
1902 Sturgis, Richard Clipston, Boston.
1916 Sturtevant, Miss Grace, Wellesley Farms.
1910 Sullivan, Martin, Jamaica Plain.
1912 Swan, Charles H., Jamaica Plain.
1891 Sweet, Everell F., Malden.
1916 Swett, Raymond W., Saxonville.
1904 Sylvester, Edmund Q., Hanover.

1899 Taylor, Charles H., Boston.
1900 Taylor, Mrs. Thomas, Jr., Columbia, S. C.
1913 Tedcastle, Mrs. Arthur W., Hyde Park.
1896 Tenney, Charles H., Methuen.
1912 Thatcher, Arthur E., Bar Harbor, Me.
1898 Thatcher, William, Brookline.
1899 Thayer, Mrs. Alice R., Boston.
1900 Thayer, Mrs. Bayard, South Lancaster.
1899 Thayer, Mrs. Eugene V. R., South Lancaster.
1903 Thayer, Henry J., Boston.
1899 Thayer, John E., South Lancaster.
1899 Thayer, Mrs. John E., South Lancaster.
1899 Thayer, Mrs. Nathaniel, Lancaster.
1899 Thiemann, Hermann, Owosso, Mich.
1899 Thomas, W. B., Manchester.
1910 Thurlow, George C., West Newbury.
1913 Thurlow, Winthrop H., West Newbury.
1874 Tolman, Miss Harriet S., Boston.
1896 Toppan, Roland W., Malden.
1899 Tower, Miss Ellen May, Lexington.
1901 Tower, Mrs. Helen M., Cambridge.
1914 Towle, L. D., Newton.
1893 Trepess, Samuel J., Glencove, L. I., N. Y.
1910 Turner, Chester Bidwell, Stoughton.
1914 Tyler, Charles H., Boston.

1910 Underwood, Henry O., Belmont.
1901 Underwood, Loring, Belmont.

1873 Vander-Woerd, Charles, Waltham.
1899 Vaughan, William Warren, Boston.

1884 Vinal, Miss Mary L., Somerville.

1916 Wagstaff, Archibald, Wellesley Hills.
1909 Wainwright, Arthur, Milton.
1849 Wakefield, E. H., Cambridge.
1876 Walcott, Henry P., M. D., Cambridge.
1895 Waldo, C. Sidney, Jamaica Plain.
1914 Walker, William B., Manchester.
1896 Walsh, Michael H., Woods Hole.
1901 Waltham, George C., Dorchester.
1907 Walton, Arthur G., Wakefield.
1902 Warburton, Chatterton, Fall River.
1912 Wardwell, Mrs. T. Otis, Haverhill.
1894 Ware, Miss Mary L., Boston.
1909 Warren, Bentley W., Boston.
1889 Watson, Benjamin M., Jamaica Plain.
1884 Watson, Thomas A., East Braintree.
1914 Watters, W. F., Boston.
1905 Webster, Edwin S., Chestnut Hill.
1914 Webster, Mrs. Edwin S., Chestnut Hill.
1905 Webster, Frank G., Boston.
1907 Webster, George H., Haverhill.
1896 Webster, Hollis, Cambridge.
1905 Webster, Laurence J., Holderness, N. H.
1909 Weeks, Andrew Gray, Marion.
1901 Welch, David, Dorchester.
1902 Welch, Edward J., Dorchester.
1914 Weld, Mrs. Charles G., Brookline.
1884 Weld, Christopher Minot, Readville.
1899 Weld, Gen. Stephen M., Wareham.
1914 Weld, Mrs. Stephen M., Wareham.
1912 Wellington, Mrs. Arthur W., Boston.
1882 West, Mrs. Maria L., Neponset.
1887 Wheeler, Frank, Concord.
1889 Wheeler, James, Natick.
1897 Wheeler, Wilfrid, Concord.
1865 Whitcomb, William B., Medford.
1901 White, Mrs. Charles T., Boston.
1865 White, Francis A., Brookline.
1899 White, George R., Boston.
1909 White, Harry K., Milton.
1905 Whitman, William, Brookline.
1894 Whitney, Arthur E., Winchester.
1894 Whitney, Ellerton P., Milton
1899 Whitney, Henry M., Cohasset.
1915 Wigglesworth, Frank, Milton.
1899 Wigglesworth, George, Milton.
1863 Wilbur, George B., Boston.
1889 Wilde, Mrs. Albion D., West Roxbury.
1881 Wilder, Edward Baker, Dorchester.
1899 Williams, Miss Adelia Coffin, Roxbury.
1905 Williams, George Percy, Boston.
1899 Williams, John Davis, Boston.
1905 Williams, Mrs. J. Bertram, Cambridge.
1905 Williams, Mrs. Moses, Brookline.
1871 Williams, Philander, Taunton.
1911 Williams, Ralph B., Dover.
1915 Wilson, E. H., Jamaica Plain.
1914 Wilson, Fred A., Nahant.
1881 Wilson, William Power, Boston.
1905 Winsor, Robert, Weston.

1906 Winter, Herman L., Portland, Me.
1914 Winthrop, Greenville L., Lenox.
1914 Winthrop, Mrs. Robert, New York, N. Y.
1914 Winthrop, Mrs. Robert C., Jr., Boston.
1870 Wood, William K., Franklin.
1905 Woodberry, Miss E. Gertrude, North Cambridge.
1905 Woodbury, John, Canton.
1906 Woodward, Mrs. Samuel Bayard, Worcester.
1900 Wyman, Windsor H., North Abington.

ANNUAL MEMBERS.

1913 Adams, Charles F., Jamaica Plain.
1896 Anderson, George M., Milton.

1912 Babcock, Miss Mabel Keyes, Wellesley Hills.
1911 Bacon, Augustus, Roxbury.
1915 Baker, Mrs. G. B., Chestnut Hill.
1865 Barker, John G., South Bend, Ind.
1898 Barr, John, South Natick.
1916 Barron, Leonard, Garden City, N. Y.
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1902 Hill, Arthur Dehon, Boston.
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1914 Morse, Frank E., Auburndale.
1913 Murray, Peter, Manomet.

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1903 Nixon, J. Arthur, Taunton.

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1906 Rane, Prof. F. W., Waban.
1897 Rea, Frederic J., Norwood.
1912 Reed, H. B., South Weymouth.
1914 Rees, Ralph W., Amherst.
1893 Rich, Miss Ruth G., Dorchester.
1888 Rich, William E. C., Ocean Park, Maine
1900 Robb, Peter B., Whitinsville.
1893 Robinson, Walter A., Arlington
1915 Rosenthal, Wolf, Boston.
1892 Ross, Henry Wilson, Newtonville.
1903 Ross, Walter D., Worcester.
1909 Russell, Charles F., Weston.
1910 Rust, William C., Brookline.

1907 Sanborn, Edward W., Boston.
1897 Sander, Charles J., Brookline.
1875 Saunders, Miss Mary T., Salem.
1896 Searles, E. F., Methuen.
1910 Sears, Prof. F. C., Amherst.
1907 Seaver, Robert, Jamaica Plain.
1886 Sharples, Stephen P., Cambridge.
1907 Sim, William, Cliftondale.
1915 Slamin, John, Wellesley.
1910 Smith, D. Roy, Boston.
1914 Smith, George N., Wellesley Hills.
1914 Spaulding, Mrs. Samuel S., Springfield Center, N. Y.
1914 Sprague, George H., Ipswich.
1914 Stevenson, Robert H., Readville.
1914 Storey, Mrs. Richard C., Boston.
1914 Sturgis, Miss Lucy Codman, Boston.
1904 Symmes, Samuel S., Winchester.

1869 Tailby, Joseph, Wellesley.
1914 Thayer, John E., Jr., Lancaster.
1909 Tracy, B. Hammond, Wenham.
1913 Tuckerman, Bayard, Ipswich.
1907 Turner, Everett P., Arlington.
1892 Tyndale, Theodore H., Boston.

1911 Ufford, Charles A., Dorchester.

1881 Vaughan, J. C., Chicago, Ill.

1915 Wadsworth, Ralph E., Northboro.
1902 Ware, Horace E., Milton.
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1914 Waterer, Anthony, 3d, Philadelphia, Pa.
1914 Waterer, Hosea, Philadelphia. Pa.
1889 Welch, Patrick, Dorchester.
1915 Wetterlow, Eric H., Manchester.
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TRANSACTIONS

OF THE

MASSACHUSETTS HORTICULTURAL SOCIETY

FOR THE YEAR 1916

PART I

PUBLISHED BY THE SOCIETY
BOSTON
NINETEEN HUNDRED AND SIXTEEN

TRANSACTIONS

OF THE

MASSACHUSETTS HORTICULTURAL SOCIETY

FOR THE YEAR 1916

PART II

PUBLISHED BY THE SOCIETY
BOSTON
NINETEEN HUNDRED AND SEVENTEEN

TRANSACTIONS

OF THE

Massachusetts Horticultural Society

FOR THE YEAR 1917

PART I

BOSTON
PRINTED FOR THE SOCIETY
NINETEEN HUNDRED AND SEVENTEEN

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* Communications to the Secretary, on the business of the Society, should be addressed to him at Horticultural Hall, Boston.

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Massachusetts Horticultural Society.

1917.

The Transactions of the Society are issued annually in two parts under the direction of the Committee on Lectures and Publications.

Communications relating to the objects of the Society, its publications, exhibitions, and membership, may be addressed to William P. Rich, Secretary, Horticultural Hall, No. 300 Massachusetts Avenue, Boston, Massachusetts.

CONTENTS.

THE INAUGURAL MEETING, JANUARY 13, 1917.

TRANSACTIONS

OF THE

Massachusetts Horticultural Society.

1917, PART I.

INAUGURAL MEETING.

The Inaugural Meeting of the Massachusetts Horticultural Society for the year 1917 was held at Horticultural Hall, Boston, on Saturday, January 13, at twelve o'clock, with President Saltonstall in the Chair.

The call for the meeting was read by the Secretary and the record of the previous meeting was read and approved. The President then proceeded to deliver his Inaugural Address.

Inaugural Address of President Saltonstall.

Ladies and Gentlemen,

Members of the Massachusetts Horticultural Society:

I have derived very great pleasure from my work for the Society during the past year. The year has been one of progress although nothing of special importance has occurred. There are, however, some matters worthy of note:—

There have been ten exhibitions during the year, and something over $8,000 awarded in prizes. The large May Show was well arranged and created much favorable comment. Almost $1600.00 was contributed by members for special prizes at this show which indicates an active desire on the part of our members to coöperate.

The Fall Show is also worthy of special mention; favorable comment should be made of the fruits and vegetables which certainly rivalled in interest the exhibition of plants and flowers.

The semi-monthly exhibitions during the year have not been a

success, but it is believed advisable to have monthly exhibitions during the flowering seasons for their educational features.

Our receipts from exhibitions during the year increased from $2,097.22 to $3,909.14. This opens up good hopes for the coming year. The expenditures of the Society for the four years prior to 1916 showed excess expenditures of about $7,700 which is a very serious matter. This year our receipts exceed expenditures by about $1,060 and this small surplus should be applied against losses of previous years or held as a reserve against insurance, large premiums falling due this year.

In this connection it is pleasing to note that during the year the Society received a bequest under the will of Miss Helen Collamore, daughter of John Collamore, a former well-known resident of Boston, of five thousand dollars ($5,000) which by vote of the Trustees has been added to the permanent fund of the Society.

Our Library is one of the finest in the country, containing over twenty thousand (20,000) volumes, all well catalogued. Its usefulness will be greatly extended by printing the catalogue, the estimated expense of which is approximately four thousand dollars ($4,000) of which amount fifteen hundred dollars ($1,500) has already been subscribed by members. This subscription by members is another instance of their warm support.

The lectures of the year maintained a high standard for interest and usefulness as is shown by the following program:

Ernest H. Wilson	Flowers and Gardens of Japan.
Dr. George T. Moore	The Missouri Botanical Garden.
Prof. S. C. Damon	Alfalfa Culture in New England.
W. T. Macoun	The Development of Fruits for Special Conditions.
George C. Husmann	Some History of the Grape in the United States.
Leonard Barron	Garden Writings in America.
T. D. Hatfield	Methods used in the Propagation of Plants.
Frederick V. Coville	Taming the Wild Blueberry.
Frank N. Meyer	Economic Botanical Explorations in China.
J. J. Taubenhaus	Sweet Pea Diseases and their Control.

The lectures are certainly to be continued for another year.

The award of the George Robert White Medal of Honor: A continuing vote of thanks from the members of the Society is due to Mr. White for his gift to the Society of seven thousand five hundred dollars ($7,500) which enables the annual award of the substantial gold medal to the one who has done most for advancement of the interest in horticulture in recent years. This year the medal was awarded to William Robinson of Sussex, England, who has stimulated so much interest by his writings on horticultural subjects.

Now let us turn our thoughts to the coming year. It should be the aim of the Society, first, to stimulate a broader interest in horticulture in all its branches, flowers, fruits, and vegetables. One of the means for best accomplishing this result is to increase our membership. We have now 760 life members and 165 annual members; a total of 925. In 1915 we had 934 members. In 1871 we had over 1,000 members. We have really gone back a bit during the year. Let us increase the membership at least 100 during this year.

Exhibitions: A year ago the Trustees conceived the plan of having one or two special shows during the year. It was the show in May, last year, the object of which was to attract exhibits from a wider field, to stimulate the growing of new varieties, to eliminate as far as possible repetition from year to year of the same class of exhibits, and to effect this result, it is proposed to have the special shows come at different times of the year.

The special exhibitions this year are to be the March Show, the Outdoor June Show, and the October Fruit Show. March Show: Something over $4,000 in prizes have been provided for this Show, this being a favorable season for indoor products. June Outdoor Show: The Society has held out-of-door shows three times during its existence,— the first in 1852, Public Gardens; the second in 1855, Boston Common; the third in 1873, on Boston Common under the supervision of Mr. Hollis Hunnewell and Prof. Charles S. Sargent. Mr. Hunnewell guaranteed the Society against loss from this show, but instead of resulting in a loss, the Society made a handsome return. Prof. Sargent and Mr. Walter Hunnewell may be called the sponsors for the coming show in June. The grounds

of the Arioch Wentworth Institute on Huntington Avenue, containing about 3 acres, will be graded and enclosed, and an artificial pond will be constructed. Five separate tents will be provided for the different exhibits and there will be another tent for a general exhibit. Professor Sargent will exhibit azaleas, Mr. Thomas Roland will exhibit roses, Mr. Farquhar will exhibit a rock garden, Messrs. Dane, Cooley, and others will exhibit orchids. 250 rhododendrons are already on way from England from Mr. Waterer, and rhododendrons will also be exhibited by Mr. Hunnewell. There will be no money prizes except such Special Prizes as may be offered by members or friends of the Society. The general plan follows that adopted in the London Shows.

No expense of any kind will fall upon the Society. An admission fee will be charged and it is hoped in this way to cover expenses; the loss, if any, is to be borne by various subscribers, a dozen or more having already signed a promise to this effect. We expect that the show will excel anything of the kind ever given in this country, and every member should interest himself in its success. Mr. Thomas Allen is in general charge, and any member may secure space by applying to him. Any member who may expect to have anything to show should give early notice as the space is fast being allotted.

The Fall Fruit Show in conjunction with the biennial meetings of the Pomological Society and the New England Fruit Show will be held some time in October. The Society has appropriated $2,000 for prizes and expenses incident to this show of which $1,000 is to be raised by subscriptions from members and friends of the Society.

This general statement of our purposes for the year we hope indicates to our members that the Trustees are working hard to advance the work in which our Society is engaged. Please remember that it is always easy to criticise and find fault. Take hold and do constructive work, and do not stand on the side lines ready to criticise what others are earnestly trying to accomplish.

For a busy lawyer who is very much of an amateur in the science of horticulture, it is not easy at times to give the time and thought required to assist in carrying along these various undertakings. Any effort, to accomplish good results, requires time, thought and energy from those in charge. I pledge myself to give freely of

these during this year, certainly the last year of my presidency, but I must have your coöperation and support to accomplish successful results.

At the conclusion of his address the President called for the reports of officers and chairmen of committees which were presented in the following order:

Report of the Treasurer, Walter Hunnewell.

Report of the Board of Trustees, by the Secretary.

Report of the Committee on Prizes and Exhibitions, James Wheeler, Chairman.

Report of the Committee on Plants and Flowers, William Anderson, Chairman.

Report of the Committee on Fruits, Edward B. Wilder, Chairman.

Report of the Committee on Vegetables, John L. Smith, Chairman.

Report of the Committee on Gardens, Richard M. Saltonstall, Chairman.

Report of the Committee on Children's Gardens, Henry S. Adams, Chairman.

Report of the Delegate to the State Board of Agriculture, Edward B. Wilder.

Report of the Committee on Lectures and Publications, Wilfrid Wheeler, Chairman.

Report of the Secretary and Librarian.

The various reports were separately accepted with thanks and referred to the Committee on Publications for record in the Transactions of the Society.

The meeting was then dissolved.

William P. Rich,
Secretary.

HORTICULTURAL PAPERS.

SEED SOWING SUGGESTIONS.

By William N. Craig, Brookline, Mass.

Delivered before the Society, January 20, 1917.

Of the various methods of propagation in common usage, which include layering, grafting, budding, leaf cuttings, shoot cuttings, roots, and seeds, the last named is many times more important horticulturally as well as agriculturally than all others combined. There may be less skill necessary in the production of plants from seeds than other methods named, which are in many cases necessary for the keeping of true stocks, and in some instances seed propagation would be undesirable, but broadly speaking both horticulture and agriculture depend overwhelmingly for their existence on seeds. This be it noted is Nature's plan in forest and field the world over, in tropical, temperate, and arctic climes. It is far the most natural method whereby the majority of plants reproduce themselves, not always absolutely true to type, as this depends on insect agencies and foreign pollen which affect their fertilization. If, however, all plants naturally reproduced themselves true from seeds the wonderful variations we have in plants, flowers, and other forms of plant life could not have been obtained by cross breeding, and artificial fertilization and improvements made would necessarily have been very much slower. A seed is botanically a ripened ovule; it contains what is called an embryo or miniature plant, with leaves, a bud, and a descending axis; it is in brief a little dormant plant. What are in a broad sense termed seeds are in many cases fruits; some of these contain more than one seed or growing points, as in the case of such plants as beets, mangel wurzel, seakale, and lettuce. Nuts in variety, acorns etc. are really fruits; so are some of the cereals, and seeds of raspberries, blackberries, strawberries, and other fruits. Many winged seeds flying from such trees as elms, maples, and lindens are fruits containing a single seed. The wind carries many of these long distances, and thus disseminates them more widely; birds and

animals assist in the wider distribution of nuts, acorns, and numerous seeds.

It would be easily possible to speak for an entire afternoon on the fascinating subjects of seed distribution throughout the world; sources of seed supplies, and quantities and values of seeds produced; but it is my purpose rather to discuss the somewhat more limited, but more practical side of seed sowing itself. This may seem to many to be a very simple task, but owing to the fact that many seeds require quite long periods for germination, that many are almost infinitesimal in size and need very careful sowing, and that there are peculiarities in not a few varieties which demand special treatment for them, the field of seed sowing is less narrow than many might imagine.

The great European war has seriously impaired the supply of many seeds on which America has in the past depended; particularly is this the case with flower seeds, but vegetables are likewise affected. Blockades prevent more than a fractional part of our average annual importations from arriving, embargoes by certain of the belligerent nations prevent the exportations of certain varieties, and as America is as yet unprepared to produce seeds of as pure quality and moderate cost as many of those received from Europe, there are likely to be acute shortages in certain varieties this season, while the seeds will probably be less pure in quality and there will be more errors in nomenclature. Purchasers of seeds should remember these things, place their seed orders early and be patient pending deliveries.

We now produce in America an immense quantity of both flower and vegetable seeds, and could no doubt profitably raise many more, but not all that we need. The countries of the world will continue to be more or less inter-dependent on each other for seeds as for many other necessary commodities. Certain favorable soil and climatic conditions are necessary for the successful production of all seeds, and even we with our big country and much diversified climate cannot secure all of these vital requirements.

The annual wastage in purchased seeds is tremendous; particularly is this the case with the large and increasing army of amateur cultivators, who derive much pleasure while making their seed selections during the winter months from the numerous attractive catalogues and who invariably start their gardening with consider-

able enthusiasm, which latter quality, alas, in too many cases becomes evanescent before the crops come to maturity. Much seed is annually lost by improper conditions of the soil at sowing time, by seeding far too thickly, and not infrequently sowing in drills in which chemical fertilizers have been scattered and not properly incorporated with the soil. Seedsmen are annually blamed for many "crop failures" which are traceable to seed sowing in drills too heavily fertilized, in which the chemicals have not been properly mixed with mother earth.

Points of merit to be considered about good farm and garden seeds are: that they are able to produce vigorous or normal plants, that they are true to strain or name, and carry no impurities or adulterations. In the case of grass seeds adulterations are still too abundant, but conditions, thanks to government inspections, are steadily improving. Whether seeds have virility depends in great measure on the condition of the plants producing them, also on their age and the way they have been grown and stored.

Certain seeds like melons, beets, carrots, rape, squash, turnip, and cabbage have good germinating qualities for five or six years, in fact, 10-year-old seeds of some of these will grow, and I have in mind a case which came under my own personal notice 35 years ago, when I had occasion to sow seeds of a one-time favorite melon named Munro's Little Heath in a hot-bed; the seeds had been kept for over 18 years yet they germinated well and the melons fruited satisfactorily. On the other hand sweet corn, millet, parsnip, wheat, onion, soy beans, peas, and oats have lost their power of germination in large measure in two or three years.

Much of the success or failure in seed sowing depends on the proper preparation of the beds for all outdoor crops; a really vigorous start is a long step towards a good crop. The correct preparation of the soil has for its main object a good seed bed, the increasing of root pasturage, and the amelioration of the soil chemically and physically. If seeds germinate freely it should be in close contact with a thoroughly pulverized and later firmly settled soil. Both hand and horse tools are available in plenty for pulverizing the soil. The drier it is at seeding time, the more necessary it is to firm well by rolling or some other method, in order to secure a good germination.

There is an immense variety of seeds with widely varying needs.

I will speak briefly on the requirements of the various classes into which these are divided. There is an old axiom which says that in order to have seeds germinate well they should be covered with twice their own diameter of soil. This is hardly correct. It is true that the majority of seeds might germinate well if treated thus, but in the case of outdoor crops much depends on the time of year seeds are sown. For instance — taking vegetables first — garden peas when sown very early should not be covered more than 2–2½ inches, successional sowings should go an inch deeper, and late sowings, made from May 20 to June 15, from 4½ to 5 inches deep. When the soil is very dry it materially hastens germination to run a watering can along the drills and dampen the seeds well; this is preferable to soaking the seeds over night. The latter plan, good in many ways, has some drawbacks. There is always danger of soaking rains rendering the soil unfit for seed sowing at the time the peas should go in. A point worth remembering about peas is, that they are the most nutritious of any vegetables; they extract a great deal of nourishment from the soil and for that reason they should, if possible, be given a piece of ground well manured for some crop like celery the year previously. If the fertilizing element is placed too near the seeds the plants do not root freely, hence the desirability of keeping it some distance away, incorporating it well with the soil, and thus make the roots more active. Peas are the most important pecuniarily of all garden vegetables, seed sales of them exceed that of the three next most important vegetables combined.

Root crops such as carrots, beets, parsnips, salsify, turnips, and scorzonera should be sown on land on which no fresh manure has been used, if clean roots are desired; ground well manured the previous year will suit them to a nicety. Carrots and turnips are easily sown too thickly; this entails a lot of additional work at thinning time. For the later sowings be sure to firm the soil well if the ground is very dry. It is not unusual in a dry season for seeds of root crops to lie dormant for a number of weeks. If seeds of the various root crops are covered an average of one inch it will be found about right.

Hot-beds or cold frames are invaluable for starting many vegetable and flower seeds in; even a very small garden should contain

one. It is best to excavate it to a depth of 12–18 inches, place warm manure mixed with leaves in this, watering it if at all dry, and then thoroughly tramping it; over this place 4 inches of soil consisting preferably of loam and very old, well-rotted and pulverized manure, use some leaf mold if soil is at all heavy, screen at least the upper half of the soil, draw shallow drills and in them sow seeds, very lightly cover, of early cabbage, cauliflower, lettuce, tomato, egg plant, celery, and pepper. It is well to remember that seeds sown in cold frames, or in flats or pans in a greenhouse, need much lighter covering than the same varieties of seeds sown outdoors.

Do not sow vegetables or flower seeds broadcast in the frames, nor outdoors; if in drills it is possible to cultivate between them, also weed and thin them; for seeds of slow germination broadcasting is permissible but it is a slovenly system for outdoor crops which make quick growth and will yield at best but half a crop. It is a system which can safely be commended to the lazy man who would be satisfied with a fraction of a crop.

If birds or rodents trouble peas, beans, squash, sweet corn, and other crops, roll the seeds in a mixture of coal tar and lime before sowing, one taste usually suffices for either feathered or furry foes. The coating of tar and lime will not affect the germinating qualities of the seeds treated. Mice are sometimes very troublesome where lettuce, tomato, endive, and other small vegetable seeds are started under glass; traps and cats are useful, but a little white arsenic mixed in toasted cornflakes which have been slightly moistened acts even more effectively.

Success with onions is more certain if the same ground is used for them each year, and if it is thoroughly firmed before drills are drawn at all. In choosing a seed bed for cabbage, cauliflower, Brussels sprouts, and savoys be sure to select one which is free from club root, or better not sow at all; this disease annually destroys many of the Brassicas and its presence shows an over acid condition of the soil, which a liberal dressing of lime in the fall will help to remedy. Always sow seeds of this class of vegetables thinly in the drills; if not you must thin while small or plants will be pure weaklings. Remember that leafy crops such as spinach, Swiss chard, lettuce, endive, and rhubarb should have a soil rich in nitrogen, the best form of which is good barnyard manure and that fruiting varieties

such as tomatoes, egg plants, and peppers like considerable potash in the soil. If you like sweet corn sow an early batch an inch deep about April 20, later sowings two inches deep, and as late as July 4 for an average season. No garden can be called complete without its patch of herbs; sow any of these from May 1 to 15; cover such fine seeds as thyme and sweet marjoram very sparingly; summer savory, dill, fennel, sweet basil, lavender, borage, and other sorts can be covered one inch.

I have only touched on some vegetables but must now turn to flowers; these on the whole need much more careful covering than vegetables. Of the better known and hardier annuals, quite a number are better started in a hot-bed or greenhouse; this includes such popular subjects as asters, stocks, salpiglossis, salvias, zinnias, marigolds, nemesias, verbenas, petunias, vincas, lobelias, phlox drummondi, snapdragons, and balsams. The majority of these may also be started outdoors but it is much more satisfactory to start under glass. Petunias and lobelias have very small seeds and should be sown in pans which should be well drained, some moss placed over the drainage, a little coarse soil over this, and the balance should consist of equal parts loam and leaf mold with a good dash of sand through it; this should be passed through a fine screen, then pressed firmly in the pans with a piece of board, watered with a watering pot with a fine rose, dusted with sand, and the fine seeds scattered over this. Take a pinch of seed between the forefinger and thumb and distribute it as evenly as possible over the surface and do not cover the seed at all. To prevent seed washing to the side of the pans cut a piece of tissue paper and lay over the surface of the pans and water over this; it helps to prevent drying of the soil and stops seed washing; it decays and allows seedlings to push through it readily. This plan is not necessary where experts are sowing and caring for seeds but it will prove useful to amateurs sowing such small seeds as petunias, lobelias, begonias, gloxinias, mimulus, etc.

Such well known annuals as bachelor's buttons, mignonette, candytuft, lupines, poppies, sweet alyssum, and godetias can be sown as soon as frost has left the ground and it has dried sufficiently to be workable. Sweet peas cannot be sown too early after frost has gone; the roots will go well down into the cool, moist earth

before the growths appear; cover two inches deep but never hill up, as too many catalogues and magazine writers recommend, or you will regret it.

Sow that splendid annual hunnemannia or Mexican poppy about May 10, which is also a safe date to sow salpiglossis, one of our most beautiful annuals, and others which are more or less tender. Such annuals as scabious, brachycomes, gypsophila, sweet sultan, clarkia, portulacas, calendulas, coreopsis, statices, chrysanthemums, larkspurs, dianthus, sunflowers, gaillardias, schizanthus, nemophila, love-in-a-mist, eschscholtzias, and cosmos may be safely sown any time after April 15 in this latitude if the ground has become dry; if not it is safer to wait a couple of weeks. Such subjects as gypsophila elegans, larkspurs, shirley poppies, clarkias, schizanthus, candytuft, and sweet alyssum should be sown two or three times to secure a succession of bloom, making the last sowing as near June 1 as possible.

Hardy herbaceous perennials are wonderfully popular now. I well remember the fight waged by Mr. William Robinson through the columns of the English "Garden" to secure them suitable recognition in the early '80's of the last century. A great proportion of these hardy plants are easily and inexpensively raised from seed. Taking first those usually treated as biennials, but some of which are perennial, we have pansies, bedding violas, double daisies, rockets, forget-me-nots, Canterbury bells, foxgloves, hollyhocks, and honesty; of these, pansies, violas, forget-me-nots and daisies should be sown in a cold frame, or in a shaded position outdoors from July 25 to August 1. Foxgloves and Canterbury bells need sowing in May, and hollyhocks in early July. For anyone unable to succeed with the perennial hollyhocks I would commend the annual type; these sown in April will flower well the same season, and rarely are affected by rust.

Amongst the varieties of hardy perennials which come with ease from seeds are: delphiniums, aquilegias, campanulas, centaureas, shasta daisies, poppies, thalictrums, lupines, galegas, hibiscus, pentstemons, doronicums, eryngiums, asters, and kniphofias; any of these will start readily in cold frames in light soil in April and May or August, or if strong plants are wanted in the fall, sowing can be done in flats or pans in a greenhouse in January or February.

Some perennials of slower germination are anemones, aconitums, dictamnus, trollius, some eupatoriums, some primulas and liliums, which latter are bulbous but are popular subjects in the hardy flower border. The varieties of slow germination are better sown in the fall when the seed is ripe and fresh; it will do no harm to allow the soil to freeze over winter, but the flats or seed beds should be mulched with dry leaves, tight sashes being placed over these.

Rock or alpine plants have become immensely popular the last two or three years and deservedly so; this is one of the most fascinating types of gardening, and a large proportion of the plants adaptable for rock gardens can be raised from seed, while many germinate very readily. Others are quite slow, occasionally requiring one or even two years to start. Some of those which appear quickly above ground are alyssums, aubrietias, arabis, campanulas, dianthus, arenarias, violas, many sedums, many primulas, potentillas, tunicas, geums, leontopodiums, androsaces, myosotis, cheiranthus, linarias, veronicas, and geraniums. Seed of rock plants can be sown in flats, or pans in a greenhouse, or in very shallow drills 6 inches apart in cold frames. I like to bake the soil for covering the seeds; this kills out all weed seeds and fungoid growths; it should be sifted over them through a fine screen. Seedlings if pricked out into other cold frames when of sufficient size and kept well watered can in the majority of cases be safely planted out in September, and if lightly mulched will winter perfectly, and bloom much better than the same stock planted out the following spring.

Coming to seeds of tender greenhouse plants, such varieties as gloxinias, tuberous begonias, gesnerias, tydaeas, and others with very fine seeds should be sown in pans of prepared compost as recommended for petunias and other garden annuals. The greatest care is necessary in sowing each of these; pans must be watered before and not immediately after seed is sown, sheets of glass should cover all pans, and paper or cloth be placed over this to exclude sunlight and prevent drying out; gradually remove the coverings as germination starts. Calceolarias have fine seeds and a fine dusting of sand is all the covering they need; over cinerarias should be placed a little fine earth; the same is true of primulas. Cycla-

mens like a very light covering of fine sandy soil. The proper time to sow gloxinias, begonias, and gesnerias is January; primulas sinensis, obconica, and kewensis should be started in January or February, but the beautiful and decorative P. malacoides not until July; calceolarias and cinerarias can also be started in July and cyclamens in August. Schizanthus, nemesias, calendulas, mignonette, statices and other annuals for flowering under glass should be sown in August and September, and snapdragons for early winter flowering not later than May 15. All greenhouse seeds sown in winter need a warm, moist house in which to germinate.

Seeds of such palms as cocos, phoenix, kentia, and latania if fresh usually germinate readily if sown in pans and plunged in a brisk bottom heat in a warm house. Anthuriums want similar treatment, but like to be sown in a mixture of chopped fern root and sphagnum moss. Seeds of crotons, dracaenas, marantas, and various tropical plants all need a brisk moist heat. Cannas have very hard seeds and start better if some of the shell is cut with a sharp knife, taking care not to cut the growing point; seeds should be soaked in tepid water for 24 hours before sowing; moonflowers need similar treatment. Sweet peas, especially light shelled varieties, if trimmed with a knife also start better and this plan is suggested for the more valuable varieties to be started under glass. Cobaea scandens, a popular climber, germinates better if the seeds are stood edgewise in the pots or pans.

Orchid seeds require radically different treatment from those of all other plants. Seed pods of cattleyas usually ripen about a year after fertilization; a pod will contain anywhere from 200,000 to 500,000 seeds which are remarkably fine and light. All orchid seeds germinate best if sown in spring; they are less certain if started in summer or winter. I have had the best success with cattleyas, laelio-cattleyas, and other bi-generic hybrids, also cypripediums, by sowing the seeds on coarse bath towel or burlap stretched inside a glass case, the same being damped before seeds are sown, or in filling 4 inch pots with chopped fern fibre and over the tops laying pieces of bath towel and tucking them closely down the inside edges of the pots with a pointed stick, having the surface raised and well rounded. Seed can be sown at the rate of 20,000 or more per square inch; sometimes none will germinate, the seed being barren,

at other times one or two may start, but sometimes the surfaces will be covered with tiny seedlings; these not infrequently start from the sides of the pots. Sometimes seedlings will appear within a month, at other times not for six or more months; great care is necessary in spraying, ventilating and shading the cases, and insect pests and fungoid growths must be fought. Under the most favorable conditions seedlings may flower in three to five years, but many of the best crosses require double that length of time. The orchid seedling raiser must be a pure specialist; he needs lots of patience and must never be of a nervous temperament.

Aquatic plants such as Nymphaeas and Nelumbiums germinate well if seeds are sown in small pots singly and submerged in tanks or trays of warm water in a warm house; if started in early spring the majority will attain sufficient size to flower the first season.

Ferns are raised from spores which when ripe should be cut off, placed in small bags, kept for a few days and then sown in square pans of a compost consisting of equal parts loam and peat with a good dash of sand mixed with it, and sterilized in advance; pans must be watered before spores are sown and pans must be kept in a close moist case to ensure good germination.

The propagation of trees and shrubs from seeds would use up an entire afternoon in itself if gone into at all thoroughly; I can only refer to a few of each. The propagation of both trees and shrubs is left almost entirely in the hands of nurserymen, with the exception of a limited number of private estates and such institutions as the Arnold Arboretum. There is no good reason why many more small growers should not do a little of this propagating as many varieties come very easily from seed; in many cases starting almost as quickly as our common annuals.

The various pines, spruces, firs, and thujas can be sown in early May in open frames in well pulverized soil which should be levelled and then well watered; sow the seed broadcast rather than in drills as the plants must remain at least one year in the seed beds; after seeding, sift a light covering of fine loam over the beds, cover this with a mulch of leaves slightly decayed. A safe plan is to enclose the ground or grounds with fine mesh wire netting to prevent birds or animals entering and scratching, and later cover the top with burlap. In about 30 days seedlings (under normal conditions)

of pines and spruces will be germinated sufficiently so that the mold can be removed. Seeds of evergreens are light. A pound of white pine will average 15,000 to 20,000 seeds and one of red pine 28,000 to 30,000, and if the seed is fresh the larger proportion should grow. In small batches evergreen tree seeds can be sown in pans or shallow flats in an ordinary greenhouse. All evergreens do not start so readily as those named however, and in the cases of most of the junipers and yews, germination is slow, seeds frequently not starting until the second year. As between sowing seeds of the slow germinating ones in fall or spring the former season is best if a greenhouse is at command, the seeds being then fresher.

Rhododendrons, kalmias, andromedas, callunas, ericas, and azaleas start best in pans of sandy peat, over which a thin layer of fine dry sphagnum moss is screened; the seed can be sown over this, and water then applied through a fine rose; seed will germinate much better sown on moss than direct on the soil; a temperature of 55° will suit those seeds in the early stages of growth.

Nuts of various kinds, also acorns, are better sown soon after harvesting and exposed to frost which loosens the shells and makes germination more easy. If not sown in late fall, it is better to carry them over winter in moist sand. Fruits of many plants including cotoneasters, hawthorns, hollies, loniceras, pyrus, and other fruiting varieties, should be stratified in dry sand if not sown in late fall outdoors or in the greenhouse; if outdoors they must be mulched. Freezing undoubtedly advances the time of germination of many seeds, but seed beds and pans will in many cases require to be kept a second season, as a large number will not start the first year. The longer seeds of this kind are kept in a dry state, the slower they will be in starting.

On the other hand many deciduous shrubs like buddleias, lilacs, deutzias, spiraeas, and viburnums come very readily from seeds. Shallow flats or pans containing sandy loam seem adaptable to about all tree and shrub seeds except the members of the ericaceae family which prefer a peaty soil. Elms, maples, and lindens all come easily from seeds which can be sown either in fall or spring. There are some slow and fussy subjects amongst trees and shrubs just as there are amongst other plants. It would take too long to mention each specifically; as a general rule trees and shrubs are

not much more difficult to raise from seeds than are annuals and perennials. Clematis paniculata is better sown as soon as ripe, the seeds will then appear in abundance the following summer; if not sown until spring a large proportion will not appear until the second season.

Lawn seeding is too often improperly done; it should be preceded, in the case of new lawns by very careful preparation of the soil, frequent raking being necessary to make a perfect seed bed. The seed being very light, a calm day should be selected for seeding. A common mistake made is in sowing too thickly. Heavily seeded lawns may look well at first and give a good immediate effect, but the individual plants being so terribly crowded lack vigor, and it is not by any means unusual during spells of hot, moist, and dark weather to find rot setting in, this will not occur when seed is sown more thinly. As a general rule 40–50 pounds of lawn seed should suffice for an acre, but as quality is very variable this may sometimes prove insufficient. The best all-around grass for our New England lawns is Kentucky blue grass, to which should be added some red top and Rhode Island bent, and where clover is liked add a little white clover. The best time to do seeding is from mid-August to mid-September; the next best period is from April 10 to May 15. To seed a lawn properly seed should be sown both lengthwise and crosswise; there are then unlikely to be any bare patches. A thorough raking and rolling must follow seedings and this rolling can advantageously be done several times through the season. In seeding bare patches on well established lawns, first scratch the spaces to be seeded and next mix some fine loam with grass seed and scatter over said bare spots. This is better than scattering the seed over the vacant patches and giving these a scratch with an iron rake. For permanent pastures August is far the best month to do seeding; spring seeding is usually more or less of a failure.

A point worth emphasizing is that seedlings of many garden plants possess much greater vigor and are more disease proof than the same varieties raised from cuttings. Hollyhocks and verbenas were some years ago decimated by disease and their very extinction even was threatened owing to their persistent propagation from cuttings over a long term of years. Since seedlings were raised

nearly all this debility has passed; the same is true of cinerarias. Of late years antirrhinums have advanced tremendously in popularity both as an indoor and outdoor plant. Under glass it has been clearly proven that seedlings are more vigorous, more floriferous, and vastly more disease resistant than plants raised from cuttings. Amongst vegetables there is simply no comparison in the vigor of tomatoes and cucumbers propagated from cuttings as compared with seedlings. Cuttings we know will always be necessary to secure fixed types of many plants, but seeds are and will be the principal means whereby plants of the majority of garden plants are to be propagated and perpetuated.

I must admit that I have omitted mention of a whole host of plants which can be raised from seeds, but this lecture has its limitations and I would not like to try the patience of my audience too much. To those about to purchase seeds I would say secure the best, as they prove to be the cheapest in the end. Do not trust too much to free seeds from Washington; a large percentage of these are old and inferior varieties. Free seed distribution would be a decided benefit if small sample packets of new, choice, and really desirable varieties were sent out to be tested, but as at present carried out, free seed distribution has little to recommend it, apart from benefits which may accrue to certain congressmen and their constituents, and the practice has for years been condemned by practically all horticultural and agricultural periodicals and bodies in America.

For past improvements in garden plants we owe debts of gratitude to many untiring specialists, and their continued efforts will still further benefit us. Finality is unattainable in the plant world and this adds a wondrous charm to horticulture. Novelties we are getting year by year are ever welcome and should always be given a fair trial. Do not condemn novelties after one season's test; frequently a second year may greatly improve them. We must continue to depend for our supplies on tried and tested varieties which experience has taught us will succeed best in our special soils and gardens. By growing good varieties, growing them as well as we can, and adding novelties as they appear, we will have not only good produce in abundance but our gardens will year by year furnish new points to attract and enthuse us.

THE FORMATION AND CHARACTERISTICS OF MASSACHUSETTS PEAT LANDS AND SOME OF THEIR USES.

By Dr. Alfred P. Dachnowski, Washington, D. C.

Delivered before the Society, January 27, 1917.
Illustrated by means of lantern slides and samples of peat material.

Reference to any good topographic map of Massachusetts will show a surprisingly large number of unimproved peat lands favorably located to various important market centers and to the chief lines of transportation radiating from Boston. In no state of the Union is the development of peat land resources for their food yielding value of greater importance than in Massachusetts, where agriculture in the last 5 years has seen a great change and in the further growth of which are interested the commercial and industrial prosperity of over 4,000,000 people.

The passage of legislation by the State Board of Health for the drainage of some of these peat lands and the establishment of a provision to extend the activities of the drainage engineers to aid in the preparation of peat lands for agricultural and other purposes constitutes a notable recognition of agriculture in a new direction. Not only does this imply the harmonious working together for ends of a common good, but more primarily the realization that the great peat land areas can be made a valuable resource to the state only through well planned measures controlled by State Departments working in cooperation.

Today the great increase in population demands the use of peat lands for the growth of crops and for various industrial purposes. But the very factors, however, which have brought about this great accumulation of vegetable material, and which constitutes a gain in land as against the loss upon mineral upland by erosion and leaching, may also introduce with them certain possible sources of failure. The great profits obtainable from the cultivation of truck crops may

lead to the use of certain kinds of peat land at the expense of other types of farming which would be less liable to failure or to dangerous limitations. The desire for rapid returns may not in a few instances encourage the landholder to ignore the wise rule of crop adaptation through crop rotation with suitable varieties; he may fail to heed the decreases in yield which follow a lack of knowledge of the different peat materials and their characteristics, especially the changes in conditions, such as the water table whose influence requires close and continuous study.

It would be well, therefore, to consider what is the position of Massachusetts in this matter of peat land utilization and what work should be done towards obtaining a fair degree of success in local areas with peat lands differing in material and in field conditions.

Several important elements enter into the problem under consideration, which for convenience are named (1) the influence of vegetation; (2) the influence of climate; and (3) the geological and topographic factors.

I. *The influence of vegetation.*

The native vegetation which covers the peat lands of today presents to the careful observer unmistakable features in regard to the predominating plant associations forming peat materials and the diversity of habitats which they reflect. Their various growth forms are correlated in the main with variations in the ground water table and they represent distinct effects in the method of building up strata of peat. Changes in the character of the indigenous vegetation of peat lands are as a general rule very slow under ordinary circumstances. This fact is so striking that the appearance of certain bog plants should serve the intelligent farmer not only as an index to environmental conditions and their products but also as a guide in the selection of his farm practice.

It is well known, however, that commonly the variations in peat materials over the surface area, and the nature of the sub-surface materials are rarely if ever examined in any detail, and are often entirely omitted from observation. Whether or not peat materials consist of layers of vegetable debris easily penetrated by roots of crop plants, by water and air so that they will weather, shrink and yet drain readily, or whether root penetration is limited by beds of material unlike in composition and degree of disintegration, such

as layers of plastic peat derived from aquatic plants or formed under periods of flooded and high water conditions; layers of granular material resulting from woody shrubs during periods of excessive drought conditions or following drainage changes; whether distinctions in the materials arise on account of strata of windfallen timber or of drifted impurities, such as ashes, silt, clay, or marl, the amounts of which depend on the currents of streams and rivers, their flooding power, etc.; whether plant growth and crop yield are influenced by a hardpan of fine-grained organic material or by one arising from compounds with lime or with iron; whether the contact layers of peaty material with a bottom of sand, gravel, clay, diatomaceous earth, or marl are continuous or not, and whether the mineral soils below, or those along the margins of the peat land, indicate predominantly solution and bleaching action or a deposition and "staining" process with mottled coloring,— all these points are of the greatest practical import. Marked physical differences arise from the several materials which undergo disintegration, in the relative abundance of that indefinite, fine-grained debris which plays the role in distinctions between heavy and light peat lands and which gives a certain degree of adhesive plasticity, but under some conditions render the surface peat soil almost impervious to water, probably due to the absorption of air.

The physical nature of the different peat and muck lands of the state and their respective substrata materials are doubtless of the widest practical importance, since it is in general more difficult to change the nature of the vegetable mass than to remedy the chemical deficiencies. Aside from the modifying influences of field conditions this is probably one reason why a chemical analysis of an organic soil is generally of little value in establishing relations to crop productivity. It is necessary, therefore, at least in somewhat more detail than undertaken hitherto, to understand the differences in the respective groups of peat lands, the phases of their materials and the field conditions under which they were formed. A profitable use of them can be made with related cultural methods and a choice of suitable crops. How important a detailed investigation may become to Massachusetts and for that matter to any other state, in view of the existing great geographical differences in climate, geology, and vegetational influences affecting the character

of peat lands and their agricultural and industrial possibilities, is readily apparent.

The role of vegetation in the conversion into peat lands of water basins or of wet depressions on uplands, along rivers, or at the coast has long been recognized, but the sequence of plant associations forming peat, the possible retrogressions, the origin and the conditions giving rise especially to ericaceous heath-bogs, and lastly the manner in which peat accumulation takes place are still problems at present under much discussion by investigators.

The general conclusions formed from one point of view lead, briefly stated, to the following: In common with other glaciated regions the origin of the modern era of plant life in Massachusetts dates back to the period when the continental glaciers receded toward the North pole and vegetation from the south and west once more migrated northward in the wake of the retreating ice sheet. During the time that has elapsed since the recession of the ice front, variously estimated at from 30,000 years for southern states to 20,000 years or less for northern states, many plant societies have doubtless occupied this region, which at the present time are characteristic of regions farther north. Thus the first vegetation to seize upon the areas which became exposed gradually may have been quite similar to the tundra of the far north, extensive, compact mats of herbaceous plants, and woody, prostrate forms, shrubby in appearance and chiefly of the ericaceous family. Following the tundra there developed slowly, it is presumed, a type of bog shrub stage and later one of temporary climax vegetation similar to the spruce and fir forests, which still comprise an important element on the peat lands of northern Massachusetts. Last of all followed in their northward march components from the southern coastal district, and from the plateau regions the deciduous and hardwood trees and their dependents, which at the present time predominate on the peat lands of such states as Ohio and Indiana.

Deciduous trees and some of the plants associated with them have now, that is within very recent geological time, regained only a position of their original home; they have commenced to invade this region and are establishing themselves in the more favorable sites, thus giving rise to a mixture of coniferous and deciduous forest type of peat lands, transforming them into a new and differ-

ent habitat. But the conquest of some of the former lakes, ponds, and inundated depressions along rivers and the coast is still going on and many of the isolated plant associations still survive as the remnants of a more northern type of plant succession. Coastal cedar swamps and river marshes are quite suggestive of this fact, for the cranberry sphagnum type of bog meadow described elsewhere as one of the members in the classification of peat lands (Ohio Geological Survey, Bull. 16, 1912), is of frequent occurrence as the ground mat where boreal, certain austral, and even several maritime plants may find conditions for growth and establishment. There is abundant evidence tending to show that southern plants seem to be gaining the ascendancy and that wherever suitable changes in drainage and weathering ensue, spruce, fir, tamarack, pine, and cedar become replaced largely if not entirely. Red maple, elm, ash, and others are contributing more and more to the increasing complexity of peat materials.

Very much of what we wish to know about the composition of peat materials, its variations and the effects of these upon crops depends, therefore, on the detailed study of profile sections of a peat basin; they recapitulate, so to speak, the history of its formation. There is a growing recognition of the injustice and the unbusinesslike character of treating all kinds of essentially different peat materials as being equal in quality and cropping value. It requires no argument to show that peat materials are of different composition and have different agricultural and industrial possibilities, but it demands considerable information and investigation to establish these differences scientifically and to show in what manner their agricultural and economic value is not the same. The physical constitution varies greatly according to locality and topographic features and even in the same field; a recognition of the controlling or modifying factors would emphasize to those using peat land the inherent limitations of the materials. This point is brought out clearly from any series of peat samples obtained in a profile sounding operation.

The lowest layer is frequently a plastic amorphous peat derived in the main from aquatic forms of plant and animal life (diatoms etc.), and from disintegrating floating organic debris of the marginal vegetation. When the accumulation of this material has reached

somewhere a height near the surface water the growth of marginal amphibious plants and following them a floating mat of herbaceous plants is made possible. Gradually this gives rise to a more or less continuous upper stratum of fibrous, felty or matted peat, later covering nearly the entire surface of the basin. The plants of the same association remain together and they become buried at about the same time, as a layer essentially intact. Another change in texture, structure, and composition of materials takes place when after sufficient settling and firmness, the accumulation of peat continues *above* the water table by the growth of ericaceous and other plants, commonly known as bog xerophytes. This type of peat material contains, as a layer, woody and leafy components unlike in their resistance to disintegration and dominant among which are certain waxy and resinous bodies. As the conditions which favor more effective weathering, and the action of bacteria and fungi improve in duration as well, they begin to support the growth of coniferous trees, or of a mixed forest, and later a deciduous mesophytic forest vegetation.

The organic debris is then chiefly formed from leaf fall and contains considerable amounts of soluble mineral matter brought to the surface by the activity of the roots of trees. Moreover the trees and shrubs contribute by their weight to a further sinking of the underlying fibrous mat; and by their shade the displacement of any surface herbaceous and ericaceous meadow-forms soon follows. Thus a more woody layer of peat makes its appearance, partly from windfallen timber, which takes on a granular texture as periods of drought and changes in the level of the ground water table permit the disintegrating and weathering processes to reach greater depths. Bearing in mind the great variety of topographic and other field conditions, which bring about fluctuations in the vegetation cover, or in drifted and in windfallen material, it is easily seen that many changes in peat layers and in their intergradations exist, so that it is not always possible to assign a given peat land and the series of its layers to any definite category of causal factors. Hence a careful study of the conditions which exist or may ensue as a result, for example of the depth, the number or character of drains, is one of greater importance than appears at first sight.

The main points, however, bearing on crop productivity of peat lands are the following:

(1) The composition of the horizontal and of the vertical strata of peat materials;

(2) the degree of disintegration, which is (likewise) dependent on (*a*) the character of plant associations that contributed to the deposit originally as well as at the present moment, and (*b*) the duration and effectiveness of drainage, the weathering processes and bacterio-fungal agencies under the existing field conditions;

(3) the shrinkage of the peat materials in relation to the water table to be established by drainage measures;

(4) the permeability of the materials for water, air, and roots of crop plants;

(5) the water content of the surface layer of peat soils when under certain crops.

II. *The influence of climate.*

Varied questions are raised by a consideration of the climatic factor combined with others due to the change in field conditions, in peat materials which partly accompany the sequence of peat forming vegetation, in the influence of weathering or leaching processes, or in the distribution of rainfall and variations in ground water table affecting peat lands.

The annual rainfall in the New England states ranges from 40 to 50 inches, the greater amount of which is precipitated during winter and in the cooler months of spring and autumn. This condition does not compensate for the loss by evaporation during the drier summer season and hence a more or less variable water level exists upon some peat lands lacking barriers than would be possible if the greater precipitation occurred within the warmer season of the year. On the other hand a relatively high and permanent stand of water prevails upon peat lands with natural ridges or with low gradient and where dams have been built or ditches have been neglected. The special climatic conditions under which Massachusetts peat lands have been forming render those with fluctuating changes in the water table and those with subterranean springs in need of more detailed study.

There impresses itself upon the observer a condition in the soil of certain uplands adjoining peat basins, the character of which deserves much thorough investigation. It is strikingly unlike anything observed in regional peat lands of a more continental

climate. A typical section taken under a forest cover or one of heath shrubs shows beneath the peaty humus a layer of leached-out, whitish gray sand of varying thickness and underlying it a characteristic yellow to rusty brownish iron-stained sand becoming lighter in color and fading into gray as the depth increases. Where the humus blanket has been denuded for one cause or another these bleached sands support a correlated heath vegetation resembling that of certain peat land areas. The soils appear to be unsuitable for ordinary farming practices.

Not infrequently the proportion of ferruginous constituents is found to be much more considerable along the margins of water-logged peat lands, while in other cases a bed of bog iron may occur at no great depth below the surface peaty debris. In the central portions of the peat land the iron salts in a precipitated form are as a rule not present. Before deciding on a drainage or utilization project it is important, therefore, to ascertain the location, area and thickness of the ferruginous layers and to determine the chemical nature of the constituents. In origin and formation they are post-glacial, i. e., a relatively recent contamination, and it is of the highest importance that their further development either as black sand, bog iron, or iron pan, should be checked by suitable remedial measures.

It is well known that under water-logged conditions, disintegrating organic matter and carbonated waters have a marked dissolving power upon minerals of rocks and soils and hence are very potent factors in leaching processes. Leached soils are comparatively poor in mineral plant constituents, especially in lime, potash, and iron salts; leached peat lands are usually acid in reaction, and require therefore fertilizers and the operations of liming or marling to produce the agriculturally desirable qualities of a fertile peat land. The humid climate of the New England states is very favorable to leaching processes and especially so in the presence of organic matter over porous sandy sub-soils. It appears that with the gradual increase in the mass of peat materials, accumulating since the glacial period on uplands and in lowland areas, widespread changes have been brought about from disintegrating peat by the waters which contained organic colloidal complexes in suspension and moved upward, downward or laterally, according

to circumstances through adjoining sandy areas. It is well known that much of the dissolved constituents from the upper soil layer is carried down by the seasonal rainfall and is commonly redeposited some distance below the surface soil, forming the "pan." The upper sand layers are then white or grey in color and very silicious, and where a surface layer of peat or humus is absent, the vegetation becomes more and more open, and dwarfed and heath-like. The land approaches the character of a "barren," since only plants with a shallow root system and with a low requirement of nutrition and growth appear to be able to thrive and mature.

With free drainage at deep levels, pan formation is rarely found. Investigations of European writers have shown how far-reaching is the influence of washing-out or leaching-out of the soluble constituents of the soil in climates of abundant seasonal rainfall. They have pointed out the desirability of avoiding fallows as much as possible, and of keeping the soil well occupied by crops, particularly hay and pasture grasses, certain staple crops, and root crops.

In the cases where seepage and ground water are not carried away by free drainage, the leached materials tend to accumulate in the soil and to cement the sandy substrata. During the drier season of the year the downward movement of water ceases; the groundwaters from the lower layers begin to move upward, and the soluble materials have then an upward tendency.

Periods of drought, strong winds, and consequent evaporation favor absorption and the deposition and concentration of iron and other salts in solution. The loss of any excess of carbonic acid from the underground waters, the presence of alkaline earth, or a substratum richer in soluble salts; the increased oxidation in the stratum on being exposed to the atmosphere, and the destruction of the colloidal humus complexes, which is partly accomplished by the action of bacteria,— any one or all of these factors may liberate the iron, alumina, magnesia, and others. These may form under certain conditions either nodules or concretions in the soil, or in some cases a continuous layer of considerable thickness. The solid aggregations vary widely in composition, in amount of fine-grained organic matter and in degree of cementation. Hence much importance should be attached to the character and color of peaty waters, the amount of suspended material which they con-

tain, to the direction of their transport and movement as percolating ground waters, and to the place of ulterior evaporation of these waters, e. i, the precipitation of their salts. It is needless to add that to the form of the surface drainage and the underdrainage system and to the effects of irrigation channels on the horizontal, vertical or lateral movement of such ground waters on peat land the greatest of care should be given.

Observations on peat lands with a water level 30 to 40 inches below the surface and which are not exposed to floods show that evaporation is relatively active during the summer season. This renders the surface soil when under cultivation liable to saline incrustations due to salt constituents of various kinds in solution drawn from the deeper beds. The action is strongly marked in ditches on peat lands with a water table fluctuating during the seasons for plant growth.

In deep and broad peat basins the imbibition and transport of soil waters is on the whole horizontal and dependent for its position upon those strata of peat materials whose composition and properties favor a lateral movement. This is readily observed in open ditches with peaty strata which permit underground water drainage along the cleavage lines and (upon estuarine peat land) which contain beds of diatomaceous earth or heavy layers of ash owing to severe and extensive clearing fires. The ash is chalk-like in color at the inner portions of the peat basin due to the removal of iron compounds to which the yellow and red ash at the marginal areas normally owes its color.

In shallow peat lands and those of small size and depth the transport of ground waters appears to be vertical and lateral. During floods, however, the abundance of water reduces the movement of the saline constituents and from the appearance of the characteristically bleached sands underlying the peat lands it may be concluded that the transport is then lateral and downward where under-drainage is free.

We are lacking data showing the increase in evaporation and vertical salt deposition due to specific crops, such as corn, potato, certain truck crops, and grasses for hay or pasture, but there is little doubt that onion would show an excess.

Fogs and other forms of humidity should be closely observed

since it may be regarded as probable that a considerably larger number of days with a water vapor blanket reducing low temperature in the critical frosty days of the growing period may result from the enhanced evaporation conditions consequent to the increase in cultivation. This may make the relative humidity conditions and therefore the duration of the growing period for crops more advantageous in certain localities with peat lands of greater depth of materials. But this question and others connected more chiefly with physiological effects of field conditions on crop plants demand a more thorough study than has been at present accorded to peat investigations.

III. *The geological and topographic factors.*

Owing to the solvent action of disintegrating masses of vegetable material a consideration of the underlying rocks and soils has therefore great importance practically as well as theoretically, because they are in many respects the causes of the more primary differences between marly alkaline to neutral peat lands and ferruginous and acid peat lands; they determine also in a great measure the degree of disintegration, leaching, and weathering of peat, and they condition the particular drainage measure, the choice of the crop system, and the cultural methods best suited to their respective peat materials.

According to the relief of the land Massachusetts may be divided into a number of physiographic provinces, each marked by its own characteristic topography and geologic belts.

In the western section of the state are the series of mountainous ridges of rugged topography, the rocks of which consist of strongly folded and faulted quartzites, limestones, slates, schists, etc., mostly of Paleozoic age. Of primary consideration is the fact that in the Berkshire Valley the peat lands of morainal lacustrine and of valley topography are generally underlaid by marl and similar calcareous substances.

The Connecticut Valley is marked in general by the presence of soft reddish Triassic sandstones and shales, with an occasional trap ridge. East of it in the highlands occurs a belt of folded sedimentary and metamorphic rocks and further eastward, gradually sloping toward the coast, is a broad crystalline belt consisting largely of metamorphic and igneous rocks, such as granites, mi-

caceous gneisses and others, both basic and acid, but including many altered sedimentary beds. In the vicinity of Boston and southward there are considerable areas of carboniferous sandstones, conglomerates, and slates.

The mantle of drift or till left by the glaciers masks and obscures the pre-glacial peneplain. The most characteristic forms of the glacial soils are the rounded hills of unmodified material known as drumlins, which show a tendency to linear grouping. The peat lands in their depressions are conditioned in the main by springs; but unlike those located along fault lines and issuing from rock crevices, the springs are intermittent and show their connection with the seasonal rainfall.

Another form of glacial drift are the plains of stratified sand which appear to be chiefly deltas and outwash aprons formed by streams during the successive stages of lowering of ancient glacial lakes. These sand plains may be regarded as the natural reservoirs of characteristically soft water, with a uniformly shallow water table. Peat lands occupying depressions in the stratified drift are well exemplified by the "Great Cedar Swamps," so abundant in the southeastern portion of the state. The great extent and the continuity of these sand plains has been one of the chief causes in the obstruction of former drainage channels and in the formation of those lake and river peat lands which today constitute the main peat resource of the state.

The till of the upland adjoining peat land is arenaceous, porous in texture, and supplemented with occasional interbedded and superficial layers of washed material. It readily absorbs the greater portion of the rainfall and is quite susceptible to the "podsoling" process mentioned above. Differences in this feature may be accounted for in part by the variations in the surface organic materials, in the texture and character of sub-surface mineral soils, and in the season's rainfall from year to year.

The till underlying the peat lands is prevailingly well compacted and probably is the principal source of supply as well as the factor determining the nature of the ground waters.

Beds of clay underneath peat lands are not numerous; they are found deposited at relatively low levels of elevation, and to some extent under the salt marshes and in the fresh water peat lands near the coast.

The rock formations and soils in the respective water sheds of the state and at the head of the main rivers arising there, are probably of no less importance in supplying the dominant mineral constituents of springs and groundwaters than the soils underlying the peat lands in the coastal plain section. The variations in organic materials of estuarine peat lands and the amounts of their inorganic impurities depend undoubtedly much upon the individual streams, their varying currents, flooding power, and the specific nature of the organic and mineral constituents carried in suspension. Consequently analytical work would naturally be of deep interest to those favoring the chemical side of the question in its relation to problems of fertilizer requirement in the improvement of peat lands.

However, it is still an open question whether the conditions are ripe for the closer chemical investigation which many soil students desire, except in those more extreme and primary distinctions between calcareous and ferruginous peat lands. Whether the chemical method would yield the results in any way as definitely correlated with the tilling qualities of peat lands and their agricultural or industrial value, as for example, ecological or bacteriological investigations, is a problem which warrants further investigation.

The main questions from the geological standpoint, which seem to require careful consideration are

(1) the character and the condition of the underlying rocks and mineral soils;

(2) the variations in and the nature of the ground waters at the various levels of the peat mass;

(3) the direction and the distribution of the salts during transport, especially along the lines of cleavage in the stratal ground water drainage, and their place of deposition.

IV. *Some of the uses of Massachusetts peat lands.*

There is today generally a greater interest in and a better appreciation of the advantages which peat land has over soils of other kinds in regard to cost of labor, ease of tillage, range, yield, and market of crops. Some of the factors for which the farmer is personally responsible and on which the permanent improvement of these soils largely depends, have been described elsewhere

(Journ. Amer. Peat Soc. 9, 10–21, 1915). There is need of emphasizing in this connection that much consideration should be given to the dangers from over-drainage and improper cultural methods.

As to fertilizer, either potash, principally the basic form, or manure should be used to begin the improvement of peat lands, but liming may or may not be advisable. The acidity of certain peat materials does not necessarily decrease their productivity. The only correct means, however, of determining the fertilizer requirements on peat land of specifically different peat materials consists in making actual growing tests and studying the reactions and the yields obtained. The use of manure is to be highly recommended, especially upon the heavy, compact phases of peat, which should receive the coarser manures. The value of fibrous peat material as a stable litter or bedding in stock and in dairy farming can hardly be over-estimated. Peat materials are known to absorb not only large quantities of water or of solutes but gaseous products as well. Owing to their great absorptive power peat materials are used as a deodorizer and as an efficient absorbent for gaseous ammonia formed from the decay of manure, which would otherwise escape into the air and be lost.

There is little doubt that the agricultural development of suitably prepared peat lands in Massachusetts would prove to be profitable. The cultivation of grasses and certain clovers for hay and pasture for a few years will probably be the safest operation. The pasture problem has been in the main neglected and hence it seems that it should be relatively advantageous to double the product. Moreover, the decrease in the number of head of livestock has been very great in all countries of late and a strong demand for both animals and their food is making itself felt.

But the peat lands of Massachusetts may well be utilized for other types of farming. Every effort should be made to eliminate this waste of peat land resources and to increase the food products of the state. Corn, preferably for silage purposes, potato, oats, rye, and clovers with grasses may be grown; they should be rotated every few years. Root crops to supplement pasture and used as succulent feed for stock in fall and winter on the farm would not only improve the plowed layer, but probably give fairly high yields. They should follow cereals such as rye, oats, millet, and

others. This list is not a large one, but that is mainly due to the fact that carefully conducted field trials to serve as practical demonstrations are quite essential in a state with peat lands differing in field conditions. Detailed investigations on crops with qualities of resistance, of rapidity in growth and maturity, capacity to yield suitable variations and related to specific peat materials and field conditions are still lacking from which to obtain reliable information. No less important is the greater utilization of peat lands for certain ornamental trees and shrubs and for much of the nursery stock and also for many bulb plants which are now imported from other countries with the dangers of disease infection. The peat lands of Massachusetts certainly compare favorably with those which have been so successfully utilized in Sweden, Holland, Germany, and other countries of northern Europe.

The use of peat materials for industrial purposes is constantly increasing; their place and role as stock food ingredient; their value as fertilizer dilutent or filler both with and without previous treatment or mixture with inorganic salts; their effectiveness as a carrier of bacterial inoculations; as fiber for surgical dressings, for special grades of paper, for carpets or for packing material; their value as granular, compressed or powdered peat; in the manufacture of producer gas and heating devices; the use of sapropel and ericoid materials for the distillation of tar and related products, for purposes of extraction of crude oil, ammonium sulfate, paraffin, wax or fuel gases; their effectiveness for hygienic and sanitary purposes such as peat baths and mud baths; for these and other uses peat materials are assuming considerable prominence commercially (see Bull. 16: Chapter IV, Ohio Geological Survey, 1912). It involves a knowledge of the peat materials and the removal and destruction of specifically suitable beds or strata, and therefore should be resorted to only in exceptional cases after detailed technical information has been secured. Of fundamental significance is the method of collecting the materials; this should not be done without reference to the fact that the layers of peat materials in a deposit are different in origin, composition, and properties, and in not a few instances may be entirely unsuitable for the specific uses referred to above. The economic utilization of peat materials, by far much more so than their agricultural usage, must base itself

upon a knowledge of the different kinds of peat materials and the factors in the field which conditioned their accumulation and character; hence their technical use should be treated as a rather highly specialized form of business, if the best financial results are to be obtained.

Considerable attention has been drawn of late to statements that an important and valuable effect of peat is in its value as a plant food,— i. e., in the presence of certain "accessory" organic food substances derived from bacterized peat material; very small amounts of it are thought to be sufficient to satisfy the needs of growing plants. This subject has been under investigation in Germany and in England. The action of these compounds, as yet undetermined chemically, is reported to have been variable. This no doubt may be due to the difference in character and in the conditions of the peat materials used in relation to the efficiency and the duration of action of beneficial micro-organisms. To bacteriologists the action of bacteria and fungi in converting certain organic and inorganic substances into a soluble form and to bind free atmospheric nitrogen is not a new problem. It is rather in the technical handicap of using peat materials as carriers which are free from objectionable qualities and in the development of satisfactory methods to maintain an active state of condition in the organisms yielding the requisite products.

If Massachusetts continues to forge to the front as she has done in her cranberry industry it will be through a recognition of the differences existing in field conditions of peat lands and in peat materials affected by them. This work may take much effort, but it can be accomplished through the state agencies now at work.

Conclusion.

The reconnaisance work on Massachusetts peat lands leads to the following general conclusions:

1. The inequality in the character of peat lands encountered and in the strata of their materials may render a more detailed study one of considerable advantage in their agricultural or industrial utilization and requirements.

2. It would be of special advantage should specific peat materials and field conditions be kept under observation where underdrainage is intended and where changes are being made in the groundwater table, so that the agricultural development may correspond with the existing field conditions and with the ensuing changes in the character of the peat materials.

3. Information concerning the seasonal variations in the water table, the nature of the salt constituents, and the circumstances in the field conditions which lead to the augmentation or diminution of soluble constituents is of prime importance, the effect of any accumulation of iron compounds especially requiring attention in certain cases.

4. The relation of cropping system to the several kinds of peat lands if ignored would be to the disadvantage of the real agricultural value of certain peat lands. Field trials are the more correct means under the existing conditions on the peat lands to determine the choice of crop varieties, seeding mixtures, etc., and the cultural practices to be followed.

HERBACEOUS PERENNIALS WE SHOULD GROW.

By Prof. Arno H. Nehrling, Amherst, Mass.

Delivered before the Society, with stereopticon illustrations, February 3, 1917.

I am happy to have an opportunity to address you on the subject of "Perennials we should grow" because it is a group of plants in which I am especially interested. For the last three years I have been devoting a great deal of time to the study of perennials and I do not think I have ever worked with a more interesting group of plants, and I wish to say at the outset, that herbaceous perennials unquestionably deserve the popularity which they are enjoying at the present time.

When we think of an ideal perennial garden we usually include the spring-flowering bulbs. Can you imagine our gardens without the dainty Snowdrop (*Galanthus nivalis*), followed by clumps of Crocus (*Crocus versicolor*), and the Showy Squill (*Scilla sibirica*) which open their flowers even before the snow has entirely disappeared? After these have passed away come constant changes in a well arranged perennial border every week. In fact, every day will bring forth something new to interest and delight the eye of the flower lover. Only severe freezing weather will put an end to such persistent late-blooming sorts as hardy Chrysanthemums, Japanese Anemones, New England Asters, Gaillardias, Aconitums, etc.

It is not my purpose today to treat the subject in a general way, because so much has been said and written of late concerning the management, planting, and care of herbaceous borders. I will be more specific and deal only with the perennials we should grow in our gardens. Before I take up the actual materials, however, let us trace briefly the evolution of gardening in this country from the time the Pilgrim Fathers landed on the bleak, barren shores of New

England, bringing with them a few seeds of garden pinks, and other old-fashioned garden flowers, to the present day.

When we study the history of gardening in America we find that many changes have been brought about from time to time, especially in the types of plants used in beds and borders for ornamental purposes. These changes might be termed fashions in plants. The most important change occurred with the introduction of the so-called bedding plants at the time of the Centennial Exposition in Philadelphia in 1876. These showy plants appealed strongly to the public and from that time on the so-called old fashioned flowers which our grandmothers had been growing with good results for years and years, came into disfavor with the gardener, especially the home gardener. Even twenty years ago there were few borders outside of those planted by professional gardeners on private estates and in public parks.

With the adoption of the naturalistic style of landscape gardening a decided change occurred not only in the type of materials used, but also in the manner of planting, and the last ten years has seen a growing interest in the so-called old-fashioned hardy plants which are technically known as hardy herbaceous perennials, and never have they been so highly esteemed as they are at the present time. Everyone who is fortunate enough to have even a small garden should devote at least part of it to hardy plants.

The reasons for this popularity are obvious. First of all, they are plants that live from year to year. Although the tops die off at the end of the growing season, new growths come from parts underground the following season. This of course gives the garden a feeling of permanency and by selecting the proper varieties the disappearing flowers will be continuously replaced by new ones. The colors of the varieties must be carefully studied as the color scheme is one of the primary features of the garden. The season of flowering must also be studied in order that the plants may be arranged so as to avoid clashes in color and so as to have an equality of flowers over the entire season. Even though the border is planned with utmost care, it is not always possible to have the entire border a mass of color throughout the season, and as already stated, in planning the perennial border a few clumps of spring-flowering bulbs such as Snowdrops, Scillas, etc., and masses of

annuals should be added. Annuals have a particular charm because quick results may be obtained with them, and although they are secondary in a border, they are nevertheless of vital importance in making a successful garden.

Another reason for the popularity of perennials at the present time is because of the fact that great improvements have been brought about by our nurserymen and plant hybridizers. We have much finer and many more varieties for planting than had our predecessors. It is only when a comparison is made between Delphinium, Paeony, Phlox, Asters, etc. of today with those in general cultivation ten or fifteen years ago that one realizes the extraordinary improvements that have been made.

Summing up the reasons for the increasing interest that has been taken in the cultivation of hardy herbaceous perennials the past few years, we must not overlook the fact that they are planted for effects to cover a period of years. Then too, there is no group of plants more adaptable to varied conditions of soil and location. While the majority of species prefer a good deep soil and an open position, there are a number which succeed under partially shaded conditions, and soil heavy and light, or moist and dry. Although they thrive best in the flower garden proper, there are a few which will grow better planted in the rockery, shrubbery border, or the wild garden. I might add at this point that men who are familiar with the construction of gardens have made the statement that the year 1916 went down in the history of gardening as the year of the the true beginning of rock gardening in this country. The interest in this type of gardening was stimulated to some extent by the fine displays of rock garden plants at the exhibitions throughout the land the past season.

Professional gardeners and amateurs have long ago come to the conclusion that the perennial border has passed the experimental stage and is now an important feature in every modern flower garden. From a well-planned garden or border is derived a feeling of quiet and rest that no amount of showy bedding plants such as red Geraniums, yellow Coleus, or Scarlet Sage can give us. By making the proper selection, any garden can be made attractive from early spring until fall.

Coming to the species and varieties we should grow, we now

have a splendid list from which to make selections. Many of our progressive firms have gone into the culture of perennials on a large scale. The Palisades Nurseries, Sparkill, N. Y., list over a thousand species and varieties. Henry A. Dreer, Philadelphia, R. & J. Farquhar, Boston, Bertram Farr, Wyomissing, Pa., A. N. Pierson, Cromwell, Conn., Knight & Struck, New York City, and many other progressive florists and seedsmen offer large collections. However, the number of species and varieties does not compare with the number grown on the other side of the water where this group of plants has always received a great deal of attention. Mr. M. Free, the superintendent of the Brooklyn Botanic Garden in an article in the Florists' Exchange, March 26th, 1916, makes the following statement with reference to the number of species in cultivation in this country, compared to the number used in England.

"It must be generally admitted that our perennial borders, with some few exceptions, are characterized by a great lack of variety in the plant material used. Especially is this noticeable when comparisons are made with the hardy flower borders of several European countries where the culture of herbaceous plants in borders and rock gardens has assumed enormous proportions. In the Royal Gardens, Kew, over 8000 species and varieties of herbaceous plants are grown, and it is no uncommon thing to see catalogs published by nurserymen containing over 2000 varieties. While not advocating for an instant the growing of plants simply for the sake of having a large collection, it must be conceded that when a nurseryman catalogs 2000 hardy plants, there must be a number of really meritorious subjects which are not grown in our borders, and which are not to be found in the lists published by the majority of American firms dealing in hardy plants.

"The demand for, and importance of, hardy perennials is increasing by leaps and bounds. People are getting tired of the monotony and expense of formal bedding and demand a return to the old-fashioned perennial border which, when properly constructed, provides plants in bloom, of some kind or other, from April to November. It is up to the nurserymen therefore, to see that this demand is supplied. The man who is able to do this is the one likeliest to reap the largest profits. We will have to break away from the stereotyped list of plants that everyone who grows

herbaceous plants already has in his possession and launch out in introducing new plants. Novelties are a necessity, not only from the interest they generate, but from the point of view of the matter of hard cash involved."

The English firms who specialize in hardy plants realize the important psychological fact that people are always seeking something new, and strenuous efforts are constantly being made to add new plants to their collections. The majority of the new sorts are obtained by cross-breeding standard varieties. Others obtain their novelties by sending expeditions for the purpose of collecting new plants in their native habitats.

Our own Mr. Wilson has brought to this country a large collection of trees, shrubs, and herbaceous plants, among the latter being Liliums, *Buddleia variabilis*, *Aconitum Wilsoni*, *Anemone hupehensis*, *Artemisia lactiflora*, etc.

Even though our brothers across the water are offering a larger number of species in their catalogs, we have at the present time a vast amount of material to choose from. The range of color in these plants covers a wide range of tones. Mrs. Francis King in her work on "The Well-Considered Garden" says, "Never before were seen pinks of such richness, such deep velvet-like violets, delicate buffs and salmons, actual blues, vivid orange tones, and pale beautiful lavenders." Through the magic of the hybridizers we are today without excuse for ugliness in the garden.

The question of color, if good effects are to be obtained, is an important one, and should be considered seriously when materials are being selected. The average descriptive seed or bulb list is not always as accurate as it might be. We have as yet no color standard for garden flowers. Mrs. Sedgwick in "The Garden Month by Month," provides a chart which is of great value in the selection of plants for a perennial garden. It is rather difficult to make definite recommendations regarding color selection because of the likes and dislikes of the individual. Most of us have prejudices against a certain color and disregard it completely when selecting material. This same color, when judiciously used with correlated tones, may have been transmuted into a perfect picture. The successful gardener must also be somewhat of an artist and have a keen eye for color effect, whether the scheme is one of contrasts or a gradual verging from one shade to another.

On some of our larger estates entire gardens or portions of a garden are devoted to plants of one color, such as blue, red, or white. The blue garden has been especially popular of late.

Again, coming back to the actual problem of the herbaceous perennials we should grow, let me say that in a list of 100 of the best sorts, few people agree as to which actually are the best subjects for a particular purpose. The personal element will again be an important factor in making a choice.

My recommendations will be based on tests which have been made the past three seasons in the perennial garden at the Massachusetts Agricultural College. Our collection, although far from being complete, contains at the present time over 500 different species and varieties. They are planted in beds 12 × 50 feet separated by grass walks, one row of a variety with six plants in a row. This garden has not been planted from the standpoint of artistic effects, but principally for study, all plants being provided with zinc labels.

I will not weary you with a list of all the meritorious hardy plants, but select only those which are the most useful among those we should grow. The writer has endeavored to put aside his own likes and dislikes, and included only the more satisfactory forms. There are many more sorts with strong claims of inclusion, but as our time is limited, the exclusion of many good things is inevitable.

The plants I will mention have been placed in their approximate order of flowering and there will of course be cases of overlapping throughout the season. In the period allotted to me, it will of course be impossible for me to mention the specific use of each form, however my slides will, I hope, illustrate these points to some extent.

I might classify the plants I will mention and state definitely for what position in the garden they are most satisfactory; however, since this is impossible in a short period, I have arranged the plants as to the season of flowering, height, and color of the flowers.

A collection could be selected to good advantage from the following list:

APRIL–MAY

Name	*Color*	*Height*
Arabis albida	White	6–8″
Alyssum saxatile compactum	Yellow	9–18″

Name	*Color*	*Height*
Phlox subulata	Pink	6″
Anemone pulsatilla	Light blue	9″
Veronica gentianoides	Blue	1–2′

MAY–JUNE

Doronicum platagineum excelsum	Yellow	1½–2′
Aquilegia caerulea	Light blue and white	1½–2′
" glandulosa	Blue and white	1′
" chrysantha	Yellow	2–3′
" canadensis	Scarlet and yellow	1½′
Dicentra spectabilis	Rose	2′
Iris germanica vars.	Various	2–3′
Dianthus deltoides	Deep pink	9″
Pyrethrum hybridum	Various	1½–2′
Lychnis viscaria splendens	Pink	1–1½′
Veronica amethystina	Deep blue	1–1½′
Aster alpinus	Purple	9″

JUNE–JULY

Papaver orientale	Scarlet	2–3′
Paeonia	Various	3′
Lupinus polyphyllus Moerheimi	Pink	3′
Dianthus plumarius "Her Majesty"	White	1′
Hemerocallis flava	Yellow	3′
Polemonium Richardsoni	Blue	1½′
Helenium Hoopesii	Yellow	3′
Delphinium hybridum	Blue	4–5′
" belladonna	Pale blue	4–5′
Hemerocallis Dumortieri	Yellow	1½′
Baptisia australis	Dark blue	3′
Pentstemon laevigatus digitalis	Lilac white	2½′–3′
Dictamnus albus	White	2–3′
Aconitum Napellus	Deep blue	2½′
Anthemis tinctoria Kelwayi	Yellow	3′
Anchusa italica Dropmore	Blue	4–5′
" " Opal	Light blue	4′
Campanula persicifolia	Blue	2–4′
Coreopsis lanceolata	Yellow	2–2½′
Campanula carpatica	Blue	9″
Oenothera missouriensis	Yellow	1′
" fruticosa	Deep yellow	2–3′
Heuchera sanguinea	Red	1–1½′
Veronica incana	Blue	1–1½′

Name	*Color*	*Height*
Iris laevigata (Kaempferi)	Various	2–3′
Spiraea Aruncus	White	3′
Silene orientalis	Pink	1–1½′
Polemonium caeruleum	Blue	2–3′

JULY–AUGUST

Hemerocallis aurantiaca major	Orange	3′
Delphinium grandiflorum	Blue	2½′
Armeria maritima splendens	Rose	1′
Campanula latifolia macrantha	Purple	3′
C. glomerata dahurica	Purple	2′
Gypsophila paniculata	White	2½′
Aster amellus bessarabicus	Blue	2′
Heliopsis laevis Pitcheriana	Yellow	3′
Lilium tigrinum splendens	Orange	4′
Lysimachia clethroides	White	2½′
Pentstemon barbatus Torreyi	Orange scarlet	4′
Geum chiloense "Mrs. Bradshaw"	Crimson	1½′
Gaillardia aristata	Yellow and red	2′
Monarda didyma	Bright red	3′
Physostegia virginiana	Rose purple	3–4′
Platycodon grandiflora Mariesii	Blue	1½′
Potentilla hybrida "Miss Willmott"	Cerise	1½′
Asclepias tuberosa	Orange	2½′
Stokesia cyanea	Blue	1′
Centaurea montana	Purple	1½′
Saponaria officinalis	Pink	1–1½′
Lythrum salicaria roseum superbum	Pink	4–6′
Astilbe Davidii	Deep pink	2′
Buddleia variabilis magnifica	Lilac	3–5′
Lepachys pinnata	Yellow	3–4′
Phlox glaberrima suffruticosa, var. Miss Lingard	White	2–3′
Sidalcea candida	White	2–3′
Centaurea macrocephala	Yellow	3′
Galegia bicolor Hartlandi	Pale lavender	3′

AUGUST–SEPTEMBER

Phlox paniculata vars.	Various	2–3′
Scabiosa caucasica	Pale blue	1½′
Sedum spectabile roseum	Rose	1½′
Chrysanthemum maximum King Edw. VII	White	1½′
Rudbeckia speciosa	Orange yellow	2′

Name	*Color*	*Height*
Funkia subcordata grandiflora	White	1½′
Rudbeckia sub-tomentosa	Yellow	4′
Veronica longifolia sub-sessilis	Deep blue	2½′
Helenium autumnale superbum	Yellow	4–5′
Helenium "Riverton Gem"	Dark red	3′
Echinacea purpurea	Reddish purple	3–4′
Liatris pycnostachya	Purple	3–4′
Rudbeckia laciniata fl. pl.	Yellow	5–7′
Hibiscus moscheutos varieties	Various	4–6′
Achillea ptarmica "Perry's White"	White	1½′
Aconitum autumnale	Blue	3′
Helianthus multiflorus fl. pl.	Yellow	4′
Lobelia cardinalis	Red	2½–3′
" syphititica	Blue	3–3′

SEPTEMBER–OCTOBER

Solidago rigida	Yellow	3½′
Salvia azurea grandiflora	Pale blue	3–4′
Aconitum Fischeri	Blue	2–3′
Aster novae-angliae rosea	Rose	5–6′
Boltonia latisquama	White	4–5′
Aster novae-belgii "Perry's Pink"	Deep pink	3–3½′
Aster tataricus	Purple	5–6′
Anemone japonica	White	2–3′
Aster turbinellus	Light blue	3′

RECENT TROUBLES WITH OUR FOREST TREES.

By Frank W. Rane, State Forester of Massachusetts.

Delivered before the Society, with stereopticon illustrations, February 10, 1917.

The John Lewis Russell Lecture.

We are inclined to think that originally, before our forefathers discovered these shores, America was a country largely covered with magnificent forests which had stood unmolested for centuries upon centuries and were absolutely free from all sorts of depredations particularly insects and diseases. These conditions apparently prevailed also throughout our pioneer days in every section of the country, and it is only within recent years that our real forest and tree troubles have come upon us.

As long as the normal conditions prevailed the balance of nature was preserved and there was little trouble, but with so-called development through the agency of man, complicated conditions have arisen. We have not only been cleaning up forests and utilizing the land for agriculture, which is a legitimate undertaking, but we have been recklessly allowing indifference as to future conditions until today we are beginning to reap the results. In the struggle for existence of all kinds of vegetation, particularly forest trees which are trying to exist in every condition possible excepting their normal environment, is it any wonder that they have become susceptible to all kinds of troubles?

Forest fires alone have been allowed to run rampant over our slashings and forest tracts, laying waste great expanses of territory and destroying the leaf mould and reservoirs of plant food which, had they been preserved, might have given growth to sufficient forests in the future to supply a growing nation with all the forest products it could possibly use. With the changing environment of

forests and trees, likewise has come the unbalanced conditions of animal, bird, fish, and insect life, as well as the more favorable conditions for the development of various possible plant diseases.

It is evident to the student of plant life that the above named conditions are sufficient to lead us to expect in time troubles for our forest trees, but when to this condition we add the innumerable diseases of plants and insects that have been imported from foreign countries, the whole situation becomes indeed complicated. It naturally follows that in the older sections of the nation like New England in particular, we are among the first to be affected. Here conditions have apparently reached the climax. Realizing that our future depends upon a better and more constructive agriculture and forestry our people in Massachusetts at least are awaking to a realization of the conditions which confront them.

We have been steadily but surely perfecting a state forest policy for the past ten years and while the results are not as apparent to the casual observer as we wish they were, nevertheless, like the boy who was flying his kite above the clouds, although he could not see it, he knew it was there by its pull, so in the forestry work the pull is there in Massachusetts and now and then we have the pleasure of seeing results. Every ten years we predict will revolutionize our former conditions. What Germany has accomplished in centuries from a wise forest policy we should be able to accomplish in Massachusetts in a far less time. May we not all have an active part in such a laudable undertaking?

In forest troubles we include a very large number of depredations, the more important of which are damage to forests from fire, disease, insects, wind, and animals.

In a comparatively new country like ours where practically no attention was given to future conditions, and where due consideration of them is gained only by severe experience, we awaken to find many disastrous things have been done which now must be rectified. The problems now are many and complicated, and they could have been avoided with comparatively little effort, if we had had our present knowledge.

In forest troubles coming from insects and diseases we are finding, as was the case in the fruit-growing industry, our greater troubles come from introduced or so-called foreign insects and diseases

brought to us usually on imported stock. Steps have been taken to regulate future importation through careful inspections and powers of restriction, but this is of little use in overcoming and neutralizing the depredations of those already established. It is these insects and diseases that are causing us a great amount of trouble. To cope with these unwelcome guests has proven in many cases extremely troublesome and expensive.

The writer has had much experience with forest depredations and the results secured through a careful study of utilization as a practical aid in the solution of a few of our forest troubles in Massachusetts seem very encouraging. This probably explains why the secretary of this society has asked the writer to discuss at this time recent troubles with our forest trees. I shall take up first the latest developments in the work of suppression of the gypsy and brown-tail moths in Massachusetts, and, second, the present status of the chestnut blight and the blister rust diseases of more recent years, and allude more briefly to other troubles.

In order to succeed in aiding the woodland owner in our state in his fight against the invasion of his forest growth by pests, a very careful and complete survey of the whole question of markets, materials, labor costs, cost of teaming, transportation charges, milling expenses, supervision, etc., was made in order to utilize all dormant capital in forests where possible, which otherwise would be almost a total loss. This study has proved worth the effort as not only have we been able to make the sale of forest products self-supporting, but in many cases a substantial net revenue has been secured.

For a number of years the gypsy and brown-tail moth work was confined largely to shade-trees and orchards, and the work of combating and suppressing these insects was directed towards overcoming the great loss following their ravages measured largely in aesthetic values.

As was inevitable, although the very best brains of the nation, assisted by experts from abroad, were focused upon the suppression of these insects, the spread continued throughout the forests of the eastern part of the state. As these insects became intrenched in our woodlands, which are composed of a great variety ranging from valueless scrub and brush growth to superior stands, the same

methods practiced upon preservation of trees in cities and towns were prohibitive on account of the great expense entailed. It was found that to spray an acre of woodland of average conditions, with arsenate of lead for example, would cost forty dollars, while the assessed value of the whole property might not average that amount.

Anticipating these conditions the Massachusetts State Forester set at work to meet the situation, and in a year's time evolved a spraying machine that revolutionized all previous methods. This machine was constructed of parts made of bronze metal instead of cast iron and perfected in such a way as to obtain efficiency in spraying and at the same reduce the expense of operation. The result of this improvement in our spraying equipment was to lower the comparative cost of woodland spraying from forty to six dollars per acre. In accomplishing this result the Forester desires to acknowledge the assistance of L. H. Worthley and Melvin Guptill. The former was an assistant in the department, in charge of moth work, and the latter was responsible for executing the engineering work. This powerful machine, making possible the spraying of tall trees without climbing, is economical of team and manual labor. No patents were ever applied for, and the results were given to the world. This machine has been in common use in Massachusetts and elsewhere, and aside from the natural improvements suggested from experience, and minor inventions each year, is the same machine.

Other methods of moth suppression besides spraying have been used, such as introducing parasites, creosoting egg masses, etc., all of which are of value when used intelligently, but spraying is commonly resorted to when immediate results are desired. During the past season the contract for arsenate of lead by the State Forester was for seven hundred tons, and it is believed that one thousand tons may have been used in Massachusetts.

As soon as the moths began to make inroads upon the forests we were confronted not only with improving and perfecting our spraying methods, but other economic methods suggested themselves. It was found to be a poor policy to spray good, bad, and indifferent trees alike. It naturally followed, therefore, that the undesirable ones were taken out, thus enabling the remaining trees to be sprayed

more economically. Herein lies a point to be emphasized, namely, forest utilization in connection with depredations. The chief purpose of the forester is to bring order and system out of chaos and meanwhile to determine ways and means of reducing our methods to scientific and economic practice. Upon studying the moth situation from the broad standpoint of future results when applied to forest conditions, the correct method of procedure was self-evident. As already indicated, it was an advantage to thin the forests for better spraying, and this practice naturally fell to the trained forester.

As soon as modern forestry practices were applied and sylvicultural studies made, better results followed. It was soon demonstrated that certain trees were the natural food of the moth, while others were to a greater or lesser extent immune from their attack and particularly so when in so-called clear stands or in mixtures with other species equally undesirable as moth food.

Taking advantage of these fundamentals and encouraged by actual results from the field experience, the so-called forestry methods of moth control have rapidly come to the front. During the past few years the State Forester has executed some large forest operations which have not only proven satisfactory in handling the moths, but from the economic standpoint have aided in establishing better forestry practices. The result of moth infestation in woodlands was to throw upon the market an oversupply of dead and dying forest products.

The forests of Eastern Massachusetts are the remains of a culled-out and cut-over country which has restocked itself without regulation or control. All sorts of forest types, species, mixtures, ages, and conditions are found. When the moths invade these woodlands they readily find enough of such species as they prefer to live upon until they are fairly grown and then, if compelled to do so, they finish their feeding period on whatever remains for them to devour.

Taking advantage of this fact we have inaugurated the practice of taking out those species upon which the insects thrive best, their so-called natural food trees, with the result that the conditions are unhealthy for their propagation. The evergreens, the white pine in particular, one of our most valued species, we find is

practically immune from the gypsy moth when grown in clear stands, for the reason that the very young caterpillars are unable to eat its needles. Hence if there are no deciduous trees present upon which they may feed during earlier stages of existence the pine is unmolested. Had this fact alone been known earlier in the moth suppressive work, great areas of white pine could have been saved. Our present treatment, therefore, with white pine stands is simply to thin out the growth upon which the gypsy moth naturally feeds, such as oak and gray birch, and the stand is thereafter self-protecting.

To work out a policy whereby all of the various conditions and methods could be made to harmonize and still accomplish results has been no small undertaking. The earlier moth work entailed great expense and this in itself rendered it unpopular. The constant aim at present is to conduct the work along self-supporting lines as far as possible. In forestry methods of moth control, estimates of costs are made and the forest products practically sold before the operation is begun. The State Forester and his assistants supervise the work, let contracts for the milling, chopping, hauling, etc., but the owner advances the funds for the undertaking.

During the past three years approximately forty-five thousand cords of wood and between seven and eight million feet of lumber have been operated under this plan. Every time an operation of this sort is properly done it is not only an example of good moth suppressive work, but a beginning of better forestry practice; the territory for future infestation is lessened by just that much, and, best of all, it is self-supporting. Anyone can spend money in this work, but it takes men with experience and ability to break even, or, still better, return a profit to the owner.

To find a market, or utilization alone, has been a perplexing problem. It has been necessary to actually create a market for our products. The wood-using industries had well established sources of supply and many ingenious plans were attempted before the trade could be interested. Three years ago, under very unfavorable markets, the work was made a success, and since the European War, of course, the only difficulty to surmount is that of getting efficient labor. The demand for forest products is far beyond our ability to supply.

Word has been sent out recently from the Massachusetts State Forester to all farmers and woodland owners through his local town officials and by means of the press, emphasizing the fact that this year offers exceptional opportunities for doing splendid constructive forestry work. The price of coal is very high and should present conditions continue even more direful need for fuel may exist another season. At any rate everything is favorable for the better solving of our moth troubles and establishing permanent forestry conditions.

This whole subject is discussed more fully in the publications of the Massachusetts State Forester which are available to those interested. I trust I have pointed out that utilization, particularly in our fight in the moth control work in Massachusetts, has been a very practical method of attack. This work will necessarily need to be continued for years. If the gypsy and brown-tail moths have done nothing else they have driven us to a stern realization that we need to practice more and better methods of forestry management if we are to get best results.

Chestnut Blight.

The disease known as the Chestnut Blight has swept over the northeastern part of the United States and apparently stands ready to annihilate the chestnut tree in this section. It is common to Massachusetts generally, although in some sections of the state, conditions are worse than in others. As the disease is communicable from tree to tree, and is very virulent, the outcome is entirely problematic.

As is the case with moth work, Massachusetts is giving all possible aid to chestnut tree owners in utilization of their products and at the same time is determining upon some forestry policy for the cut-over land. Where the chestnut is in mixture of pine, the pine is retained with the idea of supplanting the chestnut growth with this species. Chestnut poles, ties, and saw timber are all in demand at good prices; hence conditions are very favorable for owners to realize on this crop.

White Pine Blister Rust.

This disease has been introduced into this country on nursery stock of either the white pine or other five-leaved pines, or on the currants and gooseberries, the plants belonging to the genus Ribes. Unlike the chestnut bark disease it does not spread from pine to pine, but must alternate from pine to Ribes to complete its life cycle.

The disease is common in Europe and was found in New York State on imported stock several years ago. At that time, upon the invitation of Mr. J. S. Whipple, then Forest, Fish, and Game Commissioner of New York, a conference of officials from various states and the government met at Albany and later in New York City, where the whole matter was fully discussed. The result of these meetings was to cease importing foreign white pine stock, rigidly inspect all future imports, grow our own stock in this country, and practice a close inspection of all foreign stock already planted here with a view to destroying it should the disease appear.

Recognizing the importance of making an inspection of the foreign stock already planted in Massachusetts, the State Forester had an official representative of the Bureau of Plant Industry of the United States Department of Agriculture visit our plantations and advise us regarding them in 1911.

Last year the disease was found on two of our large private estates, one in the eastern or North Shore section, and the other in the western or popular Berkshire country. Upon finding these outbreaks interest was aroused in determining more fully the conditions generally. It was found that the currants proved a good index for determining the presence of the disease, and an inspection over a considerable portion of the state showed it to be generally infested. Believing it of sufficient importance to make even further investigation desirable in order to determine more fully to just what extent the disease may be found and to eradicate its evils, the state appropriated ten thousand dollars for use the past season. The United States Congress also appropriated fifty thousand dollars for similar use throughout the nation.

Scouting investigations have continued throughout the year

and practically the whole State of Massachusetts has been covered. It is understood that the disease is found very generally distributed over the state, being, however, more commonly found in some sections than in others.

White pines are far less affected than are currants, but here and there the pines are found to be infected with the disease. In no case, as far as the writer is aware, is there an infection of sufficient magnitude to destroy a stand of white pine of any appreciable size. Here and there, where the disease has been present for a period of years, a few fairly good-sized trees ranging up to twelve inches in diameter contained more or less blister rust cankers on their branches and some upon the upper main trunk. In most cases here, however, the trees themselves were growing in abnormal conditions and were equally unhealthy from an unfavorable environment and were afflicted with all the other diseases and insect enemies common to their kind.

In plantations of imported stock the disease is likely to be found, and in our younger plantations, if the disease is present, it is in all likelihood accounted for in this way. Plantations of native stock are practically free from the disease. There is a possible danger, however, from these native plantations having been filled in with foreign stock, which might account for some infestations.

Our Massachusetts plantations of foreign stock have been gone over each year and the infected trees have been pulled and burned. This practice, now running over a period of six years, has resulted in less and less infected trees each year, and at no time has the percentage of trees affected been as large as one per cent.

With our present knowledge of the subject, what remains for us to do in the future? The writer is willing to state that it is his belief that more harm than good has been done by the unnecessary agitation in the publicity campaign so systematically carried on at great expense, exciting people over a subject about which enough is not yet known even by experts themselves. It is a very easy matter to tear down, but quite another to build up and accomplish something. For the past ten years we have been working hard in Massachusetts to encourage better forestry practices and reforestation, particularly with white pine, has just made a good start. Our people are interested and enthusiastically coöperating. We

have millions of trees in our nurseries ready to go out, and all at once under the guise of public-spirited coöperation, and before there has been sufficient evidence, a campaign is set in motion to discourage and thwart all our laudable reforestation endeavors.

Realizing that the blister rust disease needs attention, and believing that our forests could be properly safeguarded by those who are made responsible for so doing, last year the following recommendation was made in the State Forester's annual report, and it is believed it will bear repeating now as follows:—

"The White Pine Blister Rust," one of the diseases of the white pine, should be given due consideration at the hands of our various state officials, particularly the pathologist of the Agricultural Experiment Station and the State Nursery Inspector, in determining our conditions as regards this disease. Some definite policy of holding the disease in check, or exterminating it if possible, should be adopted. It is believed that while this disease may become very destructive to our white pines, nevertheless the danger is not sufficient to discourage prospective planters of the white pine. It is not our purpose to minimize the importance of this disease, nor do we intend to lessen our endeavor to combat it. We do, however, believe it is a good policy not to over-exaggerate the danger and thus necessarily deter the constructive work of reforestation, until there is more convincing proof than is to be had at present that the disease is likely to become a great menace to white pine. It is to be hoped that the average Massachusetts citizen will continue planting white pine as enthusiastically as ever, leaving the problem of its protection from diseases and insects to be looked after by technically-trained officials."

We certainly have not sufficient knowledge at the present time to determine how serious a situation confronts us in this disease. Investigation and experience will have to serve as a guide to future operations. From a more or less careful study of conditions my personal recommendations for handling this disease for the coming year would be as follows:—

1. Empower a state department with authority to regulate and control any and all diseased white pines and Ribes (currants and gooseberries), declaring them a public nuisance and to be dealt with in a similar manner to that in which gypsy moths are now controlled.

2. Make a sufficient appropriation for carrying the work on as the exigencies of the occasion demand from year to year.

Results are what are desired, and the sooner this disease is controlled the better. Meanwhile optimism rather than pessimism will the better aid in solving our forestry problems. Where there is a will there is a way, and Massachusetts does not concede for one minute that we are going to lose our white pines, from any diagnosis that her State Forester at least can make thus far.

White Pine Aphid or Mealy-bug.

This insect is quite common throughout Massachusetts on the white pine. It is easily recognized as it is covered with a white cottony substance very similar to other species which most everyone has seen upon greenhouse or house plants at some time or other. This insect occurs on the smooth bark of young trees or on the new growth of older trees where it lives by sucking the sap. The real damage to the tree comes when these insects are very numerous. Like all aphids they multiply very rapidly under favorable conditions. White pine trees are occasionally found that are badly infested. In recent years these insects have gotten into forest nursery stock to more or less of an extent, and it is very desirable that infested stock be treated before planting. These insects while they are found upon perfectly healthy stock nevertheless are far more prevalent upon trees that are more or less abnormal from one cause or another. Trees that are weakened by overcrowding or stunted by lack of sunlight, etc. are usually infested with Chermes or the white pine aphid or mealy-bug.

During the season of 1914 this insect became quite prevalent in Massachusetts on white pine and did a great amount of damage, but the two past seasons apparently have not been so favorable for its development. That this insect is well worthy of attention is true particularly in keeping it out of young pine plantations by insisting upon clean stock. It has natural enemies and it can be controlled by spraying, but a little foresight and better forestry methods of culture will go a long way towards overcoming its depredations.

The Forest Tent Caterpillar.

This insect is closely related in its habits to the ordinary orchard or apple tent caterpillar which is known to everybody. It, however, does not build a large tent and further it has as its name implies a greater variety of foods and prefers the forests for its ranging grounds. It eats oaks, maples, ash and other deciduous trees as well as the leaves of fruit and shade trees. These insects strip whole areas of hardwood forests occasionally in like manner as the gypsy moth. They have been quite prevalent in localities in recent years in this state. They are native insects, and their natural enemies have a tendency to keep them in check. Spraying as for gypsy moths is effective.

The White Pine Weevil.

This is the insect that is responsible for destroying the leader in young white pine trees. It is very destructive causing the young pines that come up in the open pastures to become very limby and hence make poor merchantable lumber when mature. In young plantations they are often very destructive. The past season was one of the worst we have experienced for this insect.

The adult insect is similar to the plum curculio in appearance only much larger. It lays its eggs in the terminal shoot. These eggs hatch and live as larvae or grubs in this shoot until they are fully grown and have done all of their eating. They then change to the beetle form and deposit eggs for future generations. This main shoot should be cut or broken out while the grubs are working therein and burned, thereby destroying future generations. This insect is native but with our decreasing natural stands of white pine they become more concentrated upon our remaining area. Our plantations of young white pine should be gone over each year while the leaders are easily gotten at. Pruning and thinning with an idea of forest improvement of course will aid in overcoming the work of this insect.

Pine Tree Blight.

This disease of the white pine which was very prevalent throughout the season of 1907 has made its appearance again during the past year in many sections of Massachusetts. Its chief characteristic is that the tips of the needles turn brown and die. Some trees show the malady more than others, depending upon just how far down the needles from the tip the so-called "blight" has spread.

It is believed there is little that can be done for the trees thus affected as it is evidently climatic conditions in all probability that are the cause of the trouble. The percentage of trees permanently affected or that die from this trouble are very small indeed. The greatest concern that this disease has caused the past year is that it is mistaken for the white pine blister rust. Almost invariably people believe this trouble to be the blister rust.

Pathologists have thus far never agreed just as to the cause of this malady. When it occurred in 1907 our pine owners were equally scared as to the future of white pine as at the present time, many going so far as to sell their pine stands at a sacrifice. The rainy season of the past year seemed to render conditions favorable for its development while in 1907 the season was dry; hence either extreme seems to favor it. It evidently is a physiological condition rather than a disease. The Massachusetts State Forester's report for 1907 gives quite a full report of this pine tree blight.

Conclusion.

There are numerous other more or less minor troubles affecting our forest trees, but I have covered the more important ones. From time to time undoubtedly there will come into prominence pests that heretofore have been relatively unimportant, but our main concern should be to perfect our forest practices and be prepared to cope with any and all forest troubles in a comprehensive and economic manner.

HONEY-BEES IN RELATION TO HORTICULTURE.

By Dr. Burton N. Gates, Amherst, Mass.

Delivered before the Society, with stereopticon illustrations, February 24, 1917.

Honey-bees in all ages have been of service to man; first as a source of food; later in his gradually acquired arts; and but recently subjugated to his scientific and technical needs. The keeping of bees is old; but the utilization of bees is older, in fact, older without doubt, than man's first utilization of the dog, the first domesticated animal. Hence, man's interest in bees and perhaps the keeping of them, is the oldest art under the sun. What is there more ancient unless it be man himself? Thus through a succession of ages are transmitted with increasing serviceableness, the inestimable honey-bee. To the ancients they were a source of food; more recently they were found to supply wax; but a half century ago commercial beekeeping came into being; and only today are we beginning to appreciate their greatest benefit, their invaluable service in the setting of our crops of seeds, fruit, and vegetables. Thus to the labors of the honey-bees, who work the world over, unnoticed and often unappreciated, may be credited millions and billions of dollars of service; yet to the unthinking mind a bee is merely a sharp sting, something to be avoided, shunned, or at the best, merely to gladden the taste with a drop of honey.

There are two kinds of bees, solitary and colonial (social). Solitary bees live isolated and singly, seldom becoming numerous. Among the colonial bees are the bumblebee and honey-bee. While the honey-bee may be classed as wild when colonies escape from apiaries, wild bees may be considered to include particularly all bees, solitary and colonial, other than the honey-bee.

When we speak of bees, the majority think of keeping bees for honey production, or sometimes one of the many other specialized

pursuits of the beekeeper. We might dwell upon this phase of the subject with due profit to the person who could undertake beekeeping, yet, even greater profits are in store for the person who can wisely use bees in his horticultural pursuits. Bees yield the beekeepers of the United States from twenty to twenty-five million dollars annually; but their profits to the seed grower, vegetable, fruit, and nut grower defy calculation. With unquestioned certainty, while usually well repaid for his labor and investment, the beekeeper secures only the minor income offered by bees. Honey-bees are of greater value to agriculture generally than to apiculture in particular; it is to their pollination services as pollen bearers, that mankind is indebted over and above their recognized value in honey and wax production. Honey-bees, therefore, should find unrestricted favor among all who grow seed, fruit, and vegetable crops.

Pollination.

The story of pollination, the act, its purpose, and result should be common knowledge to everyone. Pollination is affected differently in different flowers; its effects differ only accidentally. It is an act of sex, the enabling of offspring through the seed only being possible in most cases among higher plants, through a union of a male (pollen grain) and female (egg or ova) cell.[1] Some plants demand a cross in this act of pollination; others suffice with self or close pollination. Science and experimentation of late teach that cross-pollination results, in most of our fruits, in something better and even more salable, even in those apples for instance, which will set fruit with their own pollen and are self-fertile. These diversities and intricacies are apart from our present purpose and, in a measure, are in the field of botany, where voluminous information on the many phases of pollination are available. For us it is more a question of practical necessities and results than the operations of the plant machinery.

[1] What is believed to be the first announcement in recognition of sex in plants was made in 1682, by Nehemiah Grew, famous botanist, who explained that pollen must reach the stigma or summit of the pistil in order to insure a fruit. For the existence of the plant it thus became a question of cross pollination, in order to afford strength, vigor, and adaptability to its environment.

It will suffice to say that pollination is a recognized necessity; that among our economic plants the transferring agents of pollen are insects, and chief among these usually are honey-bees; that few, if any, of our important vine, bush or tree fruits, are wind pollinated; that cross-pollination is accepted as the rule rather than the exception; that cross-pollination results in better size, shape, quality (keeping and eating), color, firmness, flavor, texture and the like, as well as frequently in better production and prolificness.

It should be borne in mind, however, that the fruiting of the tree, as for instance, the apple tree, depends not only upon the insect pollination, but also on its cultural care. For instance, a crop of fruit will depend upon the vitality of the tree. In a year following a heavy crop, the pollen borne in the blossoms is less virile according to the statement made to the writer by Prof. J. W. Crow, of the Ontario Agricultural College. The same is true of diseased trees. "Microscopically," Professor Crow says, "the pollen can be detected as weak."

During this conversation Professor Crow alluded to other factors in pollination. "The best conditions," he says, "for the pollination of fruit trees, is just succeeding a shower." This has been determined experimentally. Moreover, the pollen supply is directly proportional to the set of fruit.

The act of pollination by honey-bees is usually in response to an effort to secure nectar or pollen for food. Hence the close relation of fruit and vegetable growing with beekeeping. Were it not for the flowers there would be no bees [1]; safely, too, it is assured without the bees there would be a shortage of fruits.

The Need of Honey-bees in the Setting of Crops.

It is recorded that in a Massachusetts town, some years ago, bees were banished by law, and as a result there was little fruit in

[1] It has been determined by evolutionary thinkers that flowers owe their form and color to insects, which have been the selective agency in blossom shape, and markings. Had there been no bees and similar insects, there would be no elaborate and many hued flowers; had there been no flowers, there would be no bees and similar insects, as we know them. There has been this dual biogenic interdependency for centuries, eras and ages, which today precludes separability of many plants and their insect pollinators.

that town, especially in its center. On the outskirts of the town fruits matured more plentifully, suggesting that the bees from the woods were able to work the suburbs but not the center of the community.

Today it could hardly be presumed that a community would banish honey-bees. It is becoming, too, generally recognized the important part which they play in securing our crops. Yet, to a large extent, the growers of crops are securing their insect and bee service without regard to controlling or reserving their services. They are still doing to a certain extent what the people of that early Massachusetts town did when they benefited from the services of bees of the woods beyond the limits of that town. Today many large orchards, market gardens, and seed growing areas, while they are having success, are without the producer's knowledge, depending on honey-bees which may be wild in the woods or located in adjacent apiaries. There is, however, considerable risk in this because seasons fail, climatic conditions are undependable, and more especially, the prevalence of insect and bee life in any given area may vary with these and from year to year.

It is a well-known fact that the prevalence of all wild life, be it plant or animal, is subject to fluctuations, due to favorable or unfavorable environmental conditions. In a given locality under favorable conditions, its numbers may rise or under unfavorable conditions, its prevalence may be less. Take, for example, a pest of mosquitoes or houseflies. In a given community these may be prevalent one year due to conditions favorable to their propagation, while unfavorable conditions will depress their prevalence during successive years. So with wild fowl and fish, weeds, and in fact all forms of life uncontrolled by man. This is in accordance with the unrefutable, biological law. Honey-bees and wild bees are in no way an exception. Even honey-bees under man's control are subject to these environmental effects. When favored their numbers rise to the crest of prosperity and prevalence. If unfavorable circumstances set in, for instance, the entrance of a bee disease, their numbers are reduced; hard winters may also depreciate them so that in the early season when their services may be most needed as pollen bearers their prevalence is at a low ebb.

Bees for the Horticulturist.

When the horticulturist or market gardener realizes that he is depending upon the services of the fluctuating wild bees or even colonies poorly maintained in his neighborhood, he asks what can be done to overcome this unreliability and assure himself that he is to receive maximum services when the pollination of his crops most need them. The answer and recommendation is an easy one. For the protection of his crops he has but to establish an apiary in proportion to the size of his orchard or garden, which will maintain a high frequency of honey-bees as pollinators and eliminate dependency upon wild honey-bees or honey-bees from neighboring apiaries, or more especially the services of wild insect life over which he may have no control and which may fail him at a crucial moment. There is little danger of over-pollinating the orchard or fields in insect life when pollination service is desired. It is far better to flood the orchard with bees during the blooming period than to have a scarcity. Furthermore, the cost of small apiaries for orchard and market garden purposes is infinitesimal as compared with the possible benefits and returns.

The common experience of orchardists during the fruit bloom period further intensifies the necessity for their control of the pollinating agencies. How common it is in May to have inclement weather conditions which do not favor the free flight of insects and particularly of honey-bees. While wild bees and wild insects are sometimes numerous in the vicinity of orchards in bloom, weather conditions may entirely prohibit their activities as pollen bearers or more particularly, should these insects, especially the honey-bees, need to fly a mile or more in order to reach the orchard, the pollination of that orchard may be entirely abandoned, due to the prohibition of the weather, hence, for certainty honey-bees should have easy access to an orchard. Numerous observations are on record wherein orchards were successfully fertilized when the honey-bees had less than one-fourth mile to fly, while more distant orchards bore no crops. Thus the apiary in or adjacent to an orchard will safeguard failure.

Particular results as observed by orchardists and beekeepers

are numerous and a limited number of those most significant and reliable are related elsewhere.

Among the climatic agencies which affect the orchard, it is generally agreed among fruit growers that prevalence of inclement weather, rain and the usually accompanying wind during the blooming period, causes the loss of more fruit than perhaps ill weather at any other season. The damage is manifold; pollen is washed from the anthers, stigma secretion washed away or diluted so that pollen may fail to germinate; chilled air reduces the vitality of the pollen, while an excess of moisture may swell and burst the grains.

There is an accompanying factor which may serve to counteract, in part at least, unfortunate weather conditions. The Kansas Agricultural Experiment Station is responsible for the statement "that an insufficient supply of bees will hinder the setting of fruit and while other insects may take part in carrying the pollen, the fruit raisers must rely chiefly on honey-bees." Apropos of this delayed bloom, in "Bienen-Varter" are given the results of experiments in which netting was put over the branches of trees at the time of their blooming. On the covered limbs the blossoming period was prolonged as if the flowers were waiting for the bees to pollinate them. The time of prolongation of the bloom on these covered limbs in comparison with uncovered blossoms, is as follows:

Apple trees, 1 to 3 days,
Pear trees, 4 to 5 days,
Plum trees, 4 to 7 days.

Incidentally it was reported that the fruit failed to set on the covered branches.

A notable example of the effect of unfavorable climatic conditions during the blooming period of the apple orchard is reported by F. A. Merritt of Andrew, Iowa; "Our apple orchard is situated in such a way that it is exposed to both the north and south winds. About four years ago when the trees on the south row (Transcendents, they throw out a heavy growth of foliage at the same time it blooms) began to open their bloom, a heavy wind prevailed for about five days. I noticed during this period that the bees could not touch the bloom on the south side of the trees, but worked merrily on the more sheltered limbs of the north side. What was the result?

Those limbs on the north side were well loaded with fruit while on the south side there were almost none to be seen."

Fruits and Vegetables Pollinated by Bees.

Among the many cultivated plants in northern latitudes which are pollinated by honey-bees are the apple, pear, plum, quince, cherry, peach (to some extent), mulberry, peas, beans, currants, grapes, squashes, melons, cucumbers, and the cranberry. In the beekeeping literature, as well as in the publications of horticulturists, are many instances of the value of bees in setting these various fruits and vegetables. It will only be possible to select significant illustrations.

The Apple. It was reported to the writer in 1916, as observed by a fruit grower, that merely the top branches of his apple trees bore, while the lower ones, which had bloomed equally well, did not fruit. The only possible explanation which has been arrived at is that the top branches were in the path of bees which pollinated the top bloom but failed to reach the lower.

Perhaps the most significant report of the effect of the introduction of honey-bees to the apple orchard is this specific instance of a practical orchardist, Mr. Ralph C. Waring, of Colville, Wash. Two orchards of about equal acreage in a western "pocket" in the foothills of an admirable fruit land, well drained and protected from frost, were owned respectively by two men. One grower secured large crops, while his neighbor secured none, although his fruit trees were of the same age and blossomed heavily each spring. The owner, in despair of financial ruin, called upon the State Experiment Station for assistance. A specialist, who was a pomologist and entomologist, investigated the two entirely comparable orchards, and was about to leave without solving the problem when the question of bees arose. Upon inquiry it was asserted that no bees had been maintained for either orchard. Again going over the ground more carefully, the specialist found in a neglected corner of the fruiting orchard, a fallen log partially sunken in the damp land. This sheltered a very large colony of bees; to its services is attributed the success of the orchard. The following

year bees were provided in the orchard which had previously failed to fruit, resulting in a crop on which the owner netted $3,000.

Pears. The authority which is usually quoted for the pollination of pears is Norman B. Waite, in his publication of the United States Department of Agriculture, entitled "The Pollination of Pear Flowers." He says, "The common honey-bee is the most regular important and abundant visitor and probably does more good than any other species." According to Professor Waite, moreover, "pears require cross pollination, being partially or wholly incapable of setting fruit when limited to their own pollen. Some varieties are capable of self-fertilization. Varieties that are absolutely self-sterile may be perfectly cross-fertile." These are but a few of the thirteen or more conclusions which are drawn regarding the cross-pollination of pears. A thirteen per cent set of pear bloom is considered an average fruit catch, while a five to six per cent catch gives a heavy apple crop (ten to fifteen per cent is rare).

Plums and Prunes. A. H. Hendrickson [1] has been investigating prune and plum pollination during the past several years. Observation in 1915 was made of 50,000 plum and prune blossoms, and in 1916, 87,000. These observations have enabled him to draw the conclusion "that all varieties of the Japanese group of plums (*Prunus triflora*) are self-sterile with the possible exception of Climax. Varieties of this group seem to cross-pollinate readily. Of the European varieties of plums (*Prunus domestica*) Tragedy and Clyman show distinct evidence of self-sterility."

Of the prune, the French and Sugar prunes seem to be self-sterile to some extent. Robe de Sergeant and Imperial prunes are distinctly self-sterile. They, however, seem to cross-pollinate satisfactorily.

These observations were the result of a noticeable lack in the setting of certain orchards. The normal set of French prunes was about 4% as compared with 19% which was covered with a mosquito net tent under which bees were confined. Thus it has been concluded that the "French prune at least may be aided in setting a satisfactory crop by the presence of a large number of bees in the

[1] University of California Bulletin, 274, "The Common Honey-bee as an Agent in Prune Pollination."

orchard during the blossoming period." Further, "Without the aid of bees or other insects, the set of fruit on the French prune is often light." Moreover, "the Imperial does not seem able to set fruit unless pollinated by insects with pollen from the trees."

As a result of these observations, the author has stated that some growers will maintain their own apiaries, others will hire bees, while still others will give apiary rights in their orchards. The investigations and experiments are to be continued.[1]

Cherry. Observations were also made on cherries during 1916, showing that the "leading commercial varieties grow in the State [of California] including Napoleon (Royal Ann), Lambert, Bing, Black Tartarian, and Black Republican are self-sterile. There is also distinct evidence of intersterility between several varieties, for example, Bing and Napoleon. The work has not yet gone far enough to determine the best pollinizers for cherries in this State."

It has also been reported elsewhere that the owner of a large cherry orchard in California did not harvest any crop for eight successive years. In desperation he was about to dig up his trees when he was advised to introduce bees, with the result that he afterwards sold his cherry crop in the Chicago and New York City markets for $4,000. It is also reported by another Californian that one hundred colonies are necessary for one hundred and forty acres of cherry trees.

For Massachusetts conditions, everyone who has any familiarity with the pollination of cherry trees, recognizes at once the tremendous activities which bees make in our cherry trees while in bloom. The writer on one occasion observed that only that portion of a cherry tree which was sheltered from the west winds by a house, was satisfactorily pollinated and set fruit. There can be little doubt of the importance of honey-bees in cherry pollination.

Peach. Professor J. W. Crow, of the Ontario Agricultural College, in remarks made in January, 1913, says "that some varieties of peaches are as dependent on bees as are apples." The writer's observation, however, is that bees are less active in blooming peach orchards than they are in many other fruit orchards. This may not be due to the lack of nectar in the peach bloom, but

[1] Journal of Heredity, Volume VII, December, 1916, page 545.

perhaps to an excess of nectar elsewhere, which fact would only emphasize the necessity for additional bees if their service is expected in setting peaches.

In the orchard house of Stephen Morris, Philadelphia, where peaches are grown by the bushel in fifteen-inch pots under glass, the grower attributes much of his success to the effectual pollination of the blossoms by bees. It is his custom to place a colony in the house as soon as the buds appear. The bees remain until the petals fall.

Raspberry. It is only necessary to ask any good beekeeper in a raspberry growing district whether the bees visit raspberry bloom; he will tell you that some of the finest honey on the market is raspberry honey. All forms of raspberry, wild and cultivated, are most frequently attended by honey-bees.

Blackberry. While there is this peculiar affinity of the raspberry for bees, the blackberry, at least certain species, are less frequently visited. Some forms of wild blackberry are visited by bees more readily than apparently are cultivated varieties.

Strawberry. There seems to be a considerable diversity of opinion in regard to the importance of bees in strawberry culture. Professor J. W. Crow of the Ontario Agricultural College, in January, 1913, said "Strawberries are five to ten per cent wind pollinated. A strawberry as soon as pollinated drops its petals, otherwise it remains for a longer time receptive to pollen." In 1916 Mr. E. G. Carr of New Jersey assured the writer that "bees worked strawberry beds freely in New Jersey." The writer has also seen bees active on strawberry plots in Maryland. These same plots at certain times and under given circumstances, apparently are unvisited by honey-bees. There is doubtless a chance for further observation along the line of the effect of climatic conditions perhaps on the nectar flow on strawberries. There is always to be regarded, too, the counter attraction of other nectar sources when strawberries are in bloom.

Cranberry. Recent investigations have shown that honey-bees are of prime importance in setting cranberries. The owners of cranberry bogs in Massachusetts, realizing this, are maintaining their own apiaries, or hiring colonies for service on their bogs. It is estimated that it is desirable to have one colony for every two

acres. The results of experiments with bees in cranberry culture have been reported by Dr. H. J. Franklin, of the Massachusetts Agricultural College Experimental Bog in Wareham. It is not maintained, however, that the honey-bee is the only bee of service in the cranberry bog, for the solitary bees are also found.

Almonds. During 1916 [1] "Observations on almonds by Tufts show that there is a distinct pollination problem with this fruit. Thirteen varieties, including practically all grown on a commercial scale in California, proved to be wholly self-sterile under conditions existing at the University Farm. . . . Of still greater importance is the fact that two leading varieties were found to be intersterile as well as self-sterile."

It is well known to beekeepers that bees work almond trees. Some of the large and successful apiaries of California are located in almond orchards.

Vegetables. Chief among the vegetables which depend upon the honey-bee to a considerable extent for pollination are all the cucurbitaceous varieties, as field squash, cucumbers, melons, pumpkins, and the like. An observation has been made by Mr. Gregory of Massachusetts, who asserts that honey-bees are highly important in the setting of squashes, and claims also that the honey from squash is inferior.

It has been repeatedly observed that honey-bees are utilized in field cucumber growing, especially where a large number of small pickling cucumbers are produced. In Massachusetts, too, one noted melon grower hires bees for the sole purpose of setting his melon crop. This producer has told the writer that to his utilization of bees he attributes in a large measure his success with muskmelons and cantaloupes, which he sends to the finest hotels in the country.

The growing of cucumbers under glass, while a special industry, is merely the adaptation of the utilization of honey-bees. Annually several thousand colonies, perhaps three thousand, are used in the cucumber greenhouses in Massachusetts alone. Hand pollination is impossible and long ago dispensed with. One grower alone uses upwards of eighty colonies a year.

[1] Journal of Heredity, Vol. VII, No. 12, December, 1916, "Pollination Studies on California Fruits," page 545.

Bees to some extent have also been used in the setting of tomatoes in greenhouses, and by some it has been thought that a better crop of tomatoes is secured thereby.

Securing and Maintaining Bees.

Honey-bees are available for horticultural purposes in several ways. In some instances, a small number of colonies are hired for a period of a few weeks during the blossoming time of some particular crop. In other instances, fruit growers induce beekeepers to establish an apiary in their orchard, by granting them privileges and accommodations. For instance, in California, orchardists not infrequently furnish sites for apiaries and offer other inducements to locate there, as perhaps the orchardist will furnish the stands for the bee hives. This is typical of the coöperation of fruit growers and beekeepers throughout the Sacramento Valley. In Wisconsin, too, it has been stated that all large orchardists now have their apiaries in or near by. Many of the more thoughtful growers, however, believe it advisable to maintain their own bees. This can be done in one of several ways; given the time and the aptitude, the orchardist or some one hired for the purpose, may be the beekeeper; otherwise a circuit beekeeper may be employed. This practice is growing in favor among those owning moderate sized orchards, as well among the greenhouse cucumber growers and cranberry growers. The custom is to hire a practical apiarist to come periodically and care for the bees. Thus if this practical apiarist has similar engagements throughout a given district, the expense to each orchardist or cranberry grower is slight. Moreover, this coöperative plan assures the maximum efficiency of his colonies without burdening him with additional detail.

In securing bees for horticultural purposes one of the first requisites is healthy stock. Those who maintain bees for greenhouse purposes, will find it advantageous to own their own colonies rather than to purchase annually.

Purchasing the Stock. If bees are purchased it is advisable to secure healthy stock. Bees are subject to at least two prevalent diseases, known respectively as American foulbrood and European

foulbrood, to which colonies unattended may succumb rapidly. The inexperienced, therefore, should secure information and ascertain that the bees have been inspected for disease. Should disease set in a considerable loss of both bees and possibly to the orchard or market garden might result in a short time. Information concerning these diseases may usually be had through experiment stations, agricultural colleges, the U. S. Department of Agriculture, or in many states, through the Inspector of Apiaries.

Usually it is desirable to secure bees in hives which have removable frames. The ten-frame Langstroth hive is considered standard. By such an equipment uniformity with stock acquired later on or supplies procured is more readily assured. The bee for general purposes is the Italian bee.

Since the subject of this paper precludes an exhaustive discussion of the manipulation of bees, details concerning this may be had upon request of the author. There are, however, numerous books, bulletins and other sources of information available through the public libraries.

Alleged Injury to Fruit by Honey-bees.

It is occasionally alleged that bees damage the orchard in one of several ways. In one instance the writer was complained to by a farmer that the bees from his neighbor were "sucking the sweetness out of the flowers. They are there in thousands and are making the petals drop. I will be ruined by fall if something is not done." How little he realized, however, the good services which the bees were performing.

Sometimes it is concluded too hastily when bees are seen upon fallen and partially decayed fruit or possibly on overripe peaches which are still on the tree, that the bees have cut holes in this fruit. It is thought that the honey-bee is the cause of the injury. On the other hand, if the honey-bee's activity could have been traced, it would have been found that something other than the bee had first pierced the skin of the fruit. Investigations show that wasps or birds do this or that a fungus may disintegrate the skin. In some such break in the skin the honey-bee can work, but not until

the skin has been broken by some other means than that which the honey-bee possesses can she gain access to juices, even to so tender skinned fruit as grapes or plums. It has been proven by experiments that the honey-bee is physically incapable of puncturing a sound fruit.

In some instances redress for alleged damage to ripe fruit by honey-bees has been referred to the courts. One of the most celebrated cases of this kind was that of Utter *vs.* Utter, having taken place at Amity, N. Y. This case resulted in the unanimous decision of the jury to the effect that bees do not puncture sound fruit.

Experimental tests of the ability of bees to puncture fruit have been made at the Ottawa Experiment Station in Ontario, Canada. Ripe strawberries were first tried and then raspberries. These were suspended within the hives as well as in other places of easy access to bees. The fruits were exposed in at least three different ways. First, the whole fruit; second, whole fruit which had been dipped in honey; and third, similar fruit but with a slight pinhole puncture in each. A second series of experiments was made similarly with peaches, pears, plums, and grapes. "The bees began to work at once both upon the dipped and punctured fruit. The former was cleaned thoroughly of honey during the first night; upon the punctured fruit the bees clustered thickly, sucking the juice through the punctures as long as they could obtain any liquid. At the end of six days all the fruit was carefully examined. The sound fruit was still uninjured in any way. The dipped fruit was in like condition, quite sound, but every vestige of honey had disappeared. The punctured fruit was badly mutilated and worthless; beneath each puncture was a cavity, and in many instances decay had set in. The experiment was continued during the following week, the undipped fruit being left in the brood-chamber; the dipped fruit was given a new coating of honey and replaced in the super, and a fresh supply of punctured fruit was substituted for that which had been destroyed.

"After the third week the bees that belonged to the two hives, which had been deprived of all their honey, appeared to be very sluggish, and there were many dead bees about the hives; the weather being damp and cool was very much against those colonies. These colonies had lived for the first three weeks on the punctured fruit and on the honey off of the fruit which had been dipped;

as there were at that season few plants in flower from which they could gather nectar, these bees had died of starvation, notwithstanding the proximity of the ripe juicy fruit. The supply of food which they were so urgently in need of was only separated from them by the skin of the fruit, which, however, this evidence proves, they could not puncture, as they did not do so."

Alleged Injury to Pear Orchards by Blight.

Some years ago, opinion among fruit growers that bees were agents for transporting the spores of pear blight and thus the agent of dissemination of this dread plant disease, became prevalent. Various experiments were carried on in order to prove the assertion. In 1901 considerable trouble arose in Kings County, California, between the pear growers and beekeepers. The situation became tense. Further investigations were made. Bees were temporarily removed from pear orchards, but this precaution was found not to prevent the spread of pear blight. It was therefore assumed that there were sufficient bees, wild honey-bees and other insects, including ants, which were going from tree to tree by thousands, and hence were also agents in the transportation of pear blight. These were conditions over which man had no control. Hence, the honey-bees were allowed to be returned, it having been concluded that these should render invaluable service in the cross-pollination of the bloom. Recently investigations, notably those of Dr. J. H. Merrill, have fortunately for the beekeeper's interest, vindicated the honey-bee. In fact, it is improbable that the honey-bee has any part in fire-blight dissemination. By inoculation experiments and extended observation, aphids or plant lice which infest fruit trees, are found to be an active means of transmission. In conclusion of his latest observations, Dr. Merrill says,[1]

"1. The blight developed only in the tender succulent growth on the twigs.

"2. By hatching from eggs laid in blight cankers, the aphids come in contact with the fire-blight organism.

[1] Dr. J. H. Merrill, 1917, "Further Data on the Relation Between Aphids and Fire Blight (*Bacillus amylovorus* Bur. Trev.) Journal of Economic Entomology, Vol. 10, No. 1, pages 45–46.

"3. Aphids can and do inoculate trees with the bacteria of fire-blight.

"4. The amount of fire-blight infection in an orchard may be materially decreased by destroying all of the aphids which may appear there."

Injury to Cultivated Flowers.

Occasionally a beekeeper says that bees are injuring cultivated flowers, grown perhaps professionally by the floriculturists. The bees can hardly with justice be blamed. They are responding merely to their natural inclinations, namely to secure pollen or nectar. Having visited a flower and perhaps pollinated it, the flower at once responds according to its natural inclination, with the results that it drops its petals. In this way bees may cause flowers to pass more quickly than might be desired. It is pursuant to the law which was observed in the prolonged blooming period of apple orchards due to lack of pollination and which is mentioned above. If flowers are grown under glass and bees tend to mature them too rapidly, the floriculturist may exclude the bees by screening his greenhouse windows. Snapdragons are an example of a flower which quickly responds to pollination and drops its lower blooms, thus giving a ragged or unsightly stalk. A floriculturist on one occasion called the writer's attention to a considerable quantity of snapdragon which had been injured, from the market standpoint, by having been visited and pollinated by bees. However, on the whole this type of injury by bees can hardly be credited as being usual or severe.

Spraying *vs.* Beekeeping.

Of late there has been considerable discussion among the fruit growers and others who practice spraying and the beekeepers. Beekeepers have claimed severe losses due to injudicious and improper spraying. It is a pleasure to say the beekeepers are not narrow enough to presume that spraying should be stopped and yet, there is justification for their presumption that spraying should be done properly and in such a way as not to injure or destroy their

bees. On the whole good spraying practices will in no way conflict with the beekeeper's interests. Occasionally there may be some slight damage, but wholesale destruction has usually been traced to improper spraying practices. Generally speaking, it will suffice to say that a tree, or bloom of any kind, does not need to be sprayed until the petals have fallen. At this time bees are not inclined to visit the flowers, hence there can be little danger of injuring the apiary. The problem as a whole, however, is an intricate one, and where questions arise as to the time and advisability of spraying, they should be referred to an authority for discussion or settlement.

Experiments have been and are being made on the use of repellents to bees in spray mixtures. Beekeepers hope, and doubtless fruit growers and those who use spray poisons will be glad to coöperate, that the time is not far distant when the bees can be repelled so that by no accident will they come in contact with a poisonous spray. As yet, no definite instructions can be given for the use of repellents to bees in spray mixtures.

As a preliminary observation, the writer[1] on July 7, 1916, applied lime-sulphur spray to a European linden which was in full bloom. One-half only of the tree was sprayed with a solution of 1–25, the strength usually employed in spraying operations. The spraying was done between 9:30 and 10 o'clock in the morning of a bright calm day. The following observations were obtained:

Results of Lime Sulphur as a Repellent.

In the sprayed half of the tree: —
15 honey-bees.
Some wild bees.
1 milkweed butterfly.
Flies of various types numerous.
In the unsprayed half of the tree: —
53 honey-bees.
Wild bees.
Flies numerous.
4 Bombus.

[1] Gates, Burton N., Seventh Annual Report of the State Inspector of Apiaries for the Year 1916, Mass. State Board of Agriculture, Apiary Series Bulletin No. 11, pp. 16–19.

Apparently, however, after the first day, there was an increased number of bees in the sprayed portion of the tree, and a decrease in numbers in the unsprayed portion, which suggests the loss of repellent powers in the sprayed portion and a decrease in the general activity of the bees working linden; hence the observations may be questioned. On the third or fourth day, scarcely a bee could be seen in any part of the tree. Thus with limited trials, no definite conclusions could be reached.

A report of Forest Commissioner Wm. W. Colton, of Newton, along these lines, is that a material similar to sulpho-naphthol, "Milkol" may serve as a repellent. His observation is the result of having used "Milkol" in municipal spraying, during the season of 1916.

Summary.

Bees and beekeeping are inestimably important to the horticulturist. He may fertilize and cultivate the soil, prune, thin, and spray his trees, in a word, he may do all those things which modern practice advocates, yet without his pollinating agents, chief among which are the honey-bees, to transfer the pollen from the stamen to the pistil of the bloom, his crops may fail. Honey-bees in an orchard are an item of assurance or insurance and protection. Usually the expenditure is so slight that it does not warrant comparison with the possible and probable returns.

STRAWBERRY CULTURE.

By O. M. Taylor, Geneva, N. Y.

Delivered before the Society, March 3, 1917.

Of all the small fruits which occupy the time and attention of both New York and Massachusetts growers, the strawberry is outrivalled by neither blackberries, raspberries, currants, nor gooseberries, its acreage for Massachusetts more than doubling the combined area of all these fruits, according to the figures of the last Government census. This position of deserved popularity is held not through any manipulation of real estate brokers or of stock markets or from glowing descriptions of printer's ink and artist's brush, but because the fruit has won its high standing on its own merits.

It is true that the strawberry is the first of the small fruits to tempt the eye and the appetite in early summer and doubtless this fact adds to the zest with which the fruit is greeted at that time; but few indeed are the people who are not delighted both outwardly and inwardly by the handsome appearance, delicate aroma, and pleasing flavor of this class of fruit. Home-grown fruits begin to ripen about the middle of June or slightly earlier and for about three weeks there is no time when the table should not be supplied in abundance with the choicest berries and if one chooses to gather fruit in July, August, September, and October, and occasionally in November, it may be done by giving attention to some of the fall-bearing kinds; and we are then in position to echo the statement of Bryant as to the

> "Fruits that shall swell in sunny June
> And redden in the August noon."

A discussion of the culture of the strawberry leads into too many paths and byways to make it at all possible for a full consideration of the subject at this time, and in the attempt to touch upon some of the most important factors of its successful culture it will be necessary to ignore completely many points and to touch others

very lightly, while more attention must be given to some of those subjects which are the determinants of success or failure, any one of which, if lacking, may spell disaster to the strawberry grower.

It is taken for granted that the greatest interest centers around the growing of the strawberry for commercial purposes and not for home use although the latter field is far too much neglected, the requirements of which are somewhat different from the commercial end of the business. For instance, in the home the question of quality stands first, and heavy yield is not so essential, but for commercial work, no matter what happens, the variety must be sufficiently firm to ship well and the plants must be good yielders.

Detailed statements of actual operations are not in order at this time. They vary with the locality and the particular environment, and are as diverse as are the number of men growing the fruit. But there are certain essential factors of strawberry growing which are unchangeable wherever strawberries are grown and which will apply in Massachusetts just as they equally apply in New York or any other state. Any variety of strawberry to do well must be adapted to its environment and must find its local surroundings congenial or it will fail in part or altogether and become a profitless instead of a profitable kind.

Soil and climate with its twin subjects of temperature and rainfall spell success or failure with the strawberry. Fortunately, temperature feels more kindly disposed toward the strawberry than is the case with the raspberry and blackberry and it is seldom we hear of winter injury to this fruit, especially if the ground has its normal covering of winter's snow and if the plants have had their blanket of some mulch material. The fruit itself is occasionally injured by the intense heat of the sun, especially during showery weather, but the plants as a whole may be considered hardy.

Rainfall, however, is a more trying problem. The strawberry, of all small fruits has its root system nearest the surface, has the smallest capacity of soil space for root run and consequently is more quickly affected by varying conditions of moisture. This is especially true at fruiting time, during which a few days of severe drought may reduce the yield fifty per cent. There must be present, therefore, if the strawberry is to succeed, a proper amount of moisture whether it is supplied naturally or artificially.

The soil is the next important determinant. There is no question but that many varieties are partial as to soils. Just what the determining soil character is, cannot always be ascertained. We know that some varieties prefer a heavy clay soil, while other kinds are only at home in a light soil type, and doubtless many a variety would become surprisingly profitable could its soil preference be known. In a general way, however, most varieties are at their best in a wide range of soils, with the preference toward a well-drained, loamy soil, not too heavy, containing an abundance of available plant food and humus. Levels or slopes and direction of exposure are usually of minor importance.

Climate and soil being well disposed, there yet remain several factors of location which at once become great assets or heavy handicaps. These are distance of market, road conditions, character of market, facilities having to do with transportation, whether by rail or water, the availability of plenty of cheap and reasonably efficient labor. The ideal market is a good local one, but at the same time with opportunity to shift quickly to a more distant market whenever desirable and it is also a great asset not to have that market under the control of distant growers who through more favorable conditions are able to capture and often flood it just as the local fruit reaches maturity.

There is great agreement as to the value of stable manure for the strawberry. Discord and harsh sounds greet the ear, however, when an attempt is made to line up the best fertilizers for this fruit. No sooner has one grower solved the problem to his personal satisfaction than his neighbor goes him one better by securing a much heavier yield and a more handsome product with a formula quite different. Another grower trys to copy the method of his successful neighbor only to meet with failure. Growers should experiment by using various amounts and kinds of the fertilizers rich in the chief elements of plant food, nitrogen, potassium, and phosphoric acid, until by trial they have worked out the preparations which give them the best results under their own farm and soil conditions.

A discussion of varieties and how to select them is reserved for a later paragraph. Some attention, however, should be given to the kind of plants to set. Are all equally good? Can we secure an advantage at the start by good judgment in the selection of the

stock for the new plantations? From where and what plants shall we select? Shall we turn to the much advertised "Pedigreed" or "Improved Strains" or can we by selection build up a class of plants superior to the ordinary run? Time forbids a detailed discussion of these questions. Briefly stated, strong, vigorous, stocky, apparently healthy plants, with a good root system will start into new growth more quickly than weaklings, and stock should be taken from vigorous beds which have not become exhausted by a yield of fruit, selecting the larger, more mature, and older runner plants in preference to those developing late in the season, found along the outer border of the strawberry row. Experience has already taught growers to look with suspicion at the well-written, glowing accounts of the great value of "Pedigreed" stock or "Improved Strains" which are usually quoted at a high price. Many times such plants are no better than those close at hand of the type just described as a desirable stock. Would that we were certain by careful, continued selection to build up improved strains. Apparently a correct and plausible theory, and one which naturally commends itself to all who are desirous of raising the standard of excellence, yet no indisputable proof has been brought forward that such is the general result, while strange to say some of the most painstaking and careful experiments carried on continuously for a dozen years or more have left the experimenter in the dark as to the correctness of this whole theory and this statement holds true with tree fruits as well as with the strawberry. All efforts, however, to improve the plants should be encouraged, for the best are none too good.

Sex of Varieties. Some attention must be given to sex. The grower should know whether his varieties are perfect or imperfect, flowering or staminate or pistillate as they are sometimes called. The present tendency is toward the perfect-flowering kinds although some excellent varieties like the Sample and the Columbia are among the imperfect-flowering kinds, and where such kinds are grown provision must be made through the selection of other varieties to provide for the cross pollination of the blossoms. The fertilization of all strawberry blossoms is made possible mostly through the work of insects as they journey from flower to flower. As a rule more efficient pollination may be expected if more than

one variety is grown in the same field, and there is no danger of any change in color, shape, or flavor through the influence of the pollen of different varieties. Weather conditions, rains, cold, heavy winds, frosts, lack of insects, or the particular variety, all have a bearing on the completeness or incompleteness of the fertilization of the blossoms and upon the increase or decrease of "nubbins." Contrary to the opinion of some growers, there is no correllation between sex and yield.

Preparation of soil. "Well begun is half done" in preparing the soil to receive the strawberry plants and seldom if ever is its preparation overdone. If the soil be foul it may be necessary to begin a year before setting the plants by the use of cultivated crops. The applications of manure to the soil, time and depth of plowing, particular methods of bringing the soil bed into the best possible condition for the plants are as diverse and various as are the men growing the crop. There is no one method best adapted to all conditions and soils. Emphasis, however, should be laid on the importance of a well-prepared, thoroughly worked soil which has been put into good tilth, so that the plants will "take hold" as quickly as possible after setting.

Preparation of plants for setting. No elaborate system of preparation is necessary. The plants should of course not be permitted to wilt and dry out during the interval between digging and planting; dead runners should be removed, as well as some of the older leaves and the roots "shortened in" about one-third their length.

Setting the plants. There is no uniformity among growers as to distance between rows and plants, the exact time or method of setting, or the system used. Plants should not be crowded. Distance depends partly on the habit of the variety and partly on the system of growing, whether it be the matted row, the hill, or a modified form of either. The matted row system which is in most common use calls for a width of about four feet between rows, and from eighteen to twenty-four inches between plants, while the hill system requires less space each way. Both methods have their advantages and disadvantages. All are agreed as to the desirability of setting at the proper depth, neither too shallow nor too deep, the crown of the plant being on a level with the surface of the ground, and in New York spring setting is the rule.

Treatment the first summer. Cultivation should begin as soon as the plants are set, and should be repeated whenever necessary to maintain a good physical soil condition about the young plants, and is dependent largely on type of soil and condition of rainfall. Usually the entire land is given over to the strawberry crop but under favorable conditions inter-crops or companion crops of low and quick growing vegetables are used but this is not a common practice. Spring set plants should not bear fruit the first year, the blossom clusters being removed, so that the plants themselves may develop more rapidly. The first runners should be encouraged to root as soon as ready. The cultivator must be narrowed as the runners occupy the ground. It is doubtful if the practice of sowing a cover-crop among the plants in the fall should be encouraged, as the disadvantages more than offset the advantages gained.

Winter treatment. Strawberry plants are perfectly hardy yet some winter protection should be provided. The frozen ground should be covered lightly with some material of a strawy nature, not for the purpose of keeping the plants warm but to lessen the damage to the plants from the repeated freezing and thawing of the ground. This is but one of a half dozen benefits to be secured by the use of a winter mulch. Materials used are dependent on what may be available, anything that will accomplish the results desired, and which will in no way injure the plants.

Treatment the fruiting season. The strawberry bed usually requires but little attention the following spring. As warm weather approaches the winter mulch may require stirring to keep the plants from becoming smothered and when too thick the surplus is placed between the rows. Occasionally if land is foul it may be necessary to remove the mulch and cultivate between the rows after which the mulch is replaced, and the largest weeds cut out or pulled after rains. It is doubtful if the possible benefit of smudging as a protection against late frosts at blossoming time will warrant much expense in the purchase of any of the various smudging devices now on the market. The certainty of any benefit is far too uncertain.

Renewal of beds. Generally but one crop of fruit, yet in many cases two and occasionally three crops are removed before the strawberry bed is discarded. It depends largely on the condition

of the bed. No ironclad rule can be laid down, either as to how many crops shall be harvested or the particular method to follow in the renovation of the old bed. Usually by some method the matted row is narrowed down, the ground which has become hard and compact by the pickers is broken up and thoroughly worked, the remaining plants put in the very best possible condition to start new growth, stable manure or fertilizer added if available. There is no uniform practice as to mowing and burning over the old bed, some successful growers never omitting the operation, while other equally as successful growers never practice the method. It has some advantages and also some disadvantages.

Irrigation of strawberries. The importance of an adequate supply of moisture has already been referred to. All strawberry growers are familiar with the disastrous effects of periods of drought and it would seem at first sight as highly desirable to install some system whereby one would not be at the mercy of the elements as far as they relate to the water supply. Were it possible to control or regulate natural rainfall or to prognosticate the future weather conditions with accuracy, a regular, never failing, always available artificial water supply might become a valuable asset to the strawberry grower, but unfortunately, in New York State at least, we not only have no control over nature's operations but also are exceedingly poor guessers when it comes to foretelling the weather; and the experience of many a grower who has installed some plant, as the "Skinner" system for instance, has found that the systems rust out far quicker than they wear out and that in a series of years there has been but little if any financial return at all adequate to the amount of investment involved. There are, of course, exceptions to this experience. It would seem, however, judging by past experience, to be highly desirable to more fully make use of the means already at hand of conserving and utilizing the moisture supply normally available through more intensive methods of cultivation, and of previous soil preparation, especially by increasing its capacity to hold and retain moisture.

Pests and their control. Some benign influence must brood over the strawberry, shielding and protecting against many of the troubles that fruits are heir to, for it may truthfully be said that items for spray machinery and for spray materials are conspicuous

by their absence from the expense account of the strawberry grower. But very few if any strawberry growers ever spray. This does not mean that this fruit is immune from attacks of insects or fungi, but it emphasizes the truth of the statement just made as to comparative freedom from such troubles. The rotation is so short — the shortest of all the small fruits — that the pests are scarcely able to obtain a foothold. White grubs are occasionally troublesome, being the larvae from the "June bugs," and are most abundant in grass lands, which should be avoided as far as possible, although fall plowing may destroy some of the insects. Leaf rollers are sometimes in evidence, small, brownish caterpillars which roll or fold over a portion of the leaf, feeding within the protecting fold. Arsenate of lead, applied before the insect is protected or burning the beds after fruiting and if necessary, a later arsenical spray will destroy many of the insects in cases of severe infestations. The strawberry weevil occasionally puts in an appearance. Unfortunately, the egg which hatches into a whitish grub is laid in the flower bud where the grub feeds on the pollen. No satisfactory remedy can be given. Burning over the beds, clean culture, and a quick rotation furnish some relief.

Among diseases, leaf spot is the most serious trouble, but is dependent on certain weather conditions. Good air and soil-drainage with selection of somewhat resistant varieties aid in reducing the amount of injury. In severe cases, spraying with bordeaux mixture (3–3–50) as growth begins and again just before blossoming time will be found beneficial. Arsenate of lead may be combined for insect troubles. A quick rotation already referred to, tends to keep down both insects and disease.

Picking and marketing. Well begun is half done; yet the strawberry grower is scarcely more than half done when the fruit reaches maturity. There yet remains the task of picking, packing, shipping, and marketing the fruit, during which time the grower is largely at the mercy of weather conditions entirely beyond control. Here again, details vary to suit the locality or the whim or notion of the grower and are almost as various as the number of growers; but all are agreed on the importance of having the fruit arrive at its destination in good condition, free from bruises, well colored, fairly uniform in size of berry, packed neatly in clean, attractive-

looking baskets. The acme of success can never be reached when berries of all sizes and colors, with and without hulls, overripe and underripe are placed in the same box.

Yields, costs, and profits. Would that it were possible to make accurate statements in regard to productiveness, the many items of expense connected with growing the crop and in addition to these, all the items connected with harvesting and marketing the crop, including the all-important item of selling price, so that profits, always alluring yet by far too elusive, might be determined, or as sometimes occurs, the amount of loss determined. Were all factors constant, the results would be a question of mathematics, but unfortunately some items vary from year to year, others are never alike on any two farms, while still other factors are entirely beyond the control of the grower, making hasty determinations of probable yields, costs, and profits largely guesses and at this time we leave all such calculations to others.

We are, however, concerned with averages, which will appear low to many of the more successful growers, but they represent the concensus of opinion among conservative observers. 3000 quarts per acre is considered an average yield, while the average cost of growing a 32-quart crate of berries and placing it on the market is in the neighborhood of $1.00 per crate, placing a fair profit at about $1.00 per crate, the amount of yield largely determining the amount of the profit.

What to plant. We come now to our last subject, by no means least in importance, always one of the most perplexing and baffling of solution. With the best of climatic and soil conditions present, with clear-cut ideas as to the best cultural methods to follow, and with the knowledge that the best of markets is at our door, the selection of undesirable varieties may from the very start spell ultimate disaster and make all the difference between a profitable or a profitless business. Were there but few varieties available for selection and were the behavior of these varieties uniformly the same in different localities, and under various environments and in different soil types, this question would be simplified; but the fact is altogether too apparent that varieties are amazingly unstable in their behavior and the most profitable variety in one location may prove worthless or of only mediocre value elsewhere.

Of all the small fruits, the strawberry lends itself most readily to the rapid increase of varieties and catalogs are overburdened with long lists of kinds described and often illustrated in such glowing words and colors that the novice in despair would fain swallow the whole list, did space permit. The multiplicity of varieties is apparent on every hand. Fletcher, in his recent work on "North American Varieties of Strawberries" lists nearly 1900 variety names and some of our largest small-fruit nurserymen in their 1916 catalogs offer to supply growers with their choice from over 80 different kinds.

Manifestly, it is impossible for growers to test all varieties claiming attention. What then, are the guideposts to indicate the route to travel in making an intelligent selection? First, the purpose in view must be clear cut; whether for home or for commercial use; for canning factory or for local or more remote markets; the requirements of each market must be understood and the varieties selected should most nearly fit such requirements. Second, we must have, in the determination of varieties to grow, some knowledge of the comparative habits of both plant and fruit and should keep in mind some idea of the qualifications which go to make up an ideal variety. To be sure, no variety is perfect and the kinds grown are characterized by imperfections as well as by perfections. Doubtless no two growers would fully agree on all the qualifications which must be considered in the ideal strawberry because of different points of view and because of personal notions and tastes. Most of us, however, can fully agree on the most important factors which must be present in considering the ideal variety.

Plants of the ideal variety must of course be true to name. All are agreed on this, yet many a plant has fallen from grace on this one point alone. They should be possessed of reasonable health, vigor, and sturdiness, with no hint of weakness or lack of vitality, should multiply to such an extent as to fill all the space allotted, leaving no bare spots, yet should not encroach one upon another so as to become too crowded, and should mature their fruit at the time desired and in abundance. The flowers should preferably be perfect, although we have some excellent imperfect-flowering kinds, should not open too early in exposed localities, and should be well supplied with an abundance of pollen so that under favorable

conditions pollination carried on mostly by insects may proceed rapidly. Fruit stems should not be too short, and should be sufficiently stocky to aid somewhat in keeping the berries off the ground. The calyx should not be over large or of an unattractive color. The berries should be of good size, which is retained fairly well throughout the season, the shape pleasing in its beauty of form, and the color should tempt the eye at first sight, neither too light nor too dark but distinctly lively, bright, and clear, not green-tipped at the apex. The berries should be sufficiently firm for the purpose grown and should not reach the table in a mussy condition. Most important of all, the flesh characters should combine a commingling of pleasant aroma, delightful richness of agreeable flavor, abundant juice, and an entire lack of toughness, astringency, or insipidness. Such a combination of qualities forming just the right mixture of sweetness and acidity, should certainly tempt the appetite of the most fastidious palate.

As already has been suggested, tastes differ; some want an acid berry; others a sweet, mild berry; the point of view lacks uniformity and we all have our pet notions as to what constitutes perfection; yet it seems certain that most strawberry growers can fully agree on the importance and desirability of all these qualities just enumerated and the different varieties vary so widely in flavor and quality that even the most fastidious may find a variety suited to their particular taste.

The question of what to plant has not been fully answered. One solution to the question is by a careful study of the varieties in the immediate locality, selecting only such kinds that have by past experience proved their value and adaptation in that neighborhood. A second method is by trial of a few plants before planting largely to any little known variety. The test plat should be a regular feature of the strawberry grower and the newer and more promising kinds should be tested and their local value determined before planting commercially.

Brief mention has been made of a class of varieties that would extend the strawberry season through the fall months. Such kinds are designated as "Fall-bearing" varieties, and have created considerable discussion during recent years. It is true that a selection from the score or more of such kinds will make this fruit

available throughout August, September, and October, and there will be little trouble in supplying our tables at that time. If, however, it is proposed to set such plants extensively for commercial purposes, the writer suggests that moderation be exercised in the first plantings and that the acreage be enlarged only as the success of the previous plantings warrant.

Thus far, no varieties have been listed, and it is with hesitation that any names are given because of the fact that the most valuable kinds in one place may be worthless in some other locality. There are, however, a number of varieties which have made good in one part or another of New York State, although this fact has no bearing on their behavior in the Bay State. Many of them are old varieties with an established reputation, while others are among the more recent kinds; the following list is therefore only suggestive:

Amanda	Excelsior	Mascot
Barrymore	Gandy	Michel
Bederwood	Glen Mary	Ozark
Belt	Golden Gate	Prolific
Brandywine	Good Luck	Rough Rider
Chesapeake	Indiana	Sample
Columbia	Monroe	Stevens
Dunlap	Marshall	Williams.

Fall-bearing Kinds.

Americus Francis Progressive Superb.

In conclusion. This discussion, incomplete yet already too long, must be brought to a close. An effort has been made to set forth some of the essentials of strawberry growing, the observance or non-observance of which make or mar the final results. A successful grower cannot run his business by rule of thumb. Ways and means will vary from year to year to meet new conditions of climate, of season, and of markets. Strawberry growing is intensive farming; halfway measures cannot bring the results desired. The fruit itself as a basis of work is of highest rank, and recalls the old

saying, "Doubtless God could have made a better berry, but doubtless he never did," and with the many varieties at our disposal, and with a better knowledge of their adaptabilities, intelligent effort cannot fail to supply our tables with fruit most acceptable to both sight and taste.

CRANBERRY CULTURE.

By Marcus L. Urann, Boston.

Abstract of lecture delivered before the Society, with stereopticon illustrations, March 10, 1917.

Within a very few months the people of the United States will be considering, as never before, their food supplies. Not only in terms of great producers of grain and large special crops, but the question of food will be brought down more directly to the individual and he will be endeavoring to solve the problem of how he can himself produce some of his foods by utilizing his back yard or other small areas of land which will be open to his cultivation. One of the first questions confronting him is the selection of his crops. It is a rule that we should raise what we can cheaper than we can buy and buy from others what they can produce cheaper than ourselves. Now I presume we all want cranberries.

First, because of their food value, composed as they are of elements which our body needs and which will be of increasing value the plainer our general diet may become. For instance, tough and other poor quality of meats are rendered tender and more palatable cooked or eaten with cranberries. Then, too, they are an economical food there being no waste in cores or skins and very little labor required in preparation. We want them, too, because of their medicinal value. We are informed that cranberries contain predigested acids easily assimilated, acting directly on the red corpuscles in the blood.

Therefore desiring cranberries, the next question is whether or not we should produce or purchase them, this to be determined by the conditions under which they can successfully be grown.

The common swamp cranberry, known to botanists by the name of "*Vaccinium macrocarpon*," is found native in almost every state in the Union and in parts of Canada. All economic plants show a preference for certain soil and climatic conditions and none is more

exacting in this regard than the cranberry, easily and successfully grown on congenial soils, it is a failure under adverse conditions. The successful cultivation has been practically limited to Massachusetts, New Jersey, and Wisconsin, about two-thirds of the total crop coming from Massachusetts and these grown almost exclusively on Cape Cod, where the economic conditions seem to be peculiarly adapted to this particular fruit.

History. The first attempts at cultivation of cranberries in this country were made on Cape Cod about the year 1816. The general cultivation, however, does not date back further than the year 1850. The development since that time has been rapid until today there are in Massachusetts some 12,000 acres.

Necessary conditions. In locating a cranberry bog the first question, of course, is the soil, which should be of a peaty or alluvial nature, the decomposition of which has not reached a stage which will prevent the water percolating freely through it. The next requisite is drainage, which should be ample to allow the surface of the water to be kept at least two feet below the surface of the bog under any and all conditions. There must be an abundant water supply with the necessary reservoir privileges, providing protection from frost and insects. This water is used also in the proper development of the fruit itself. There must be an ample supply of sand easily accessible. The bog should be so located as to have a circulation of air and to be out of natural frost veins. After selecting a swamp with these necessary conditions the first step in preparation is:

Clearing. Some of the swamps on Cape Cod are covered with what is called brown brush, a swamp bush growing from two to six feet high. Many of the swamps, however, are covered with a heavy growth of pine, maple, and cedar trees, all of which must be removed, both the trees and the stumps to at least six inches below the finished grade of the bog. These trees are used for wood or lumber. After which we come to the second step.

Turfing. Which is removing all surface vegetation, cutting the turf into squares and turning upside down. It sounds very easy, but no part of bog building requires more skill and judgment, for in this turf are the seeds, roots, and plants, which, if not properly handled, will spring up for many years afterwards entailing a heavy expense, as well as cause damage to the young bog.

Ditching. After turfing, the drainage ditches are excavated, the size and number of which depend upon the area to be drained, the number of springs, and density of soil. They usually consist of a large ditch through the middle of the swamp and lateral ditches running at right angles from this to the upland; these latter are generally about two feet wide and deep. A ditch must entirely surround the bog at the point where the peaty soil of the swamp meets the sandy soil of the upland. This is to carry off the surface water and is a protection from insects crawling on to the bog from the upland. These ditches not only drain the swamp, permitting air circulation and chemical changes, which will furnish food supply to the plants, but also are necessary in case of flowage.

Dikes. The next step is to divide the entire swamp into sections according to its topography. It is advisable to have a swamp divided into sections of comparatively a few acres. This is accomplished by a system of dikes located according to the natural conditions of the bog. They are usually constructed by laying up two parallel walls of turf the desired distance apart, this turf having been cut from the surface of the swamp and then filling in between the two walls with sand from the upland. In locating these dikes it is necessary to have the area to be flowed by a given dike as nearly level as possible.

Grading. Each area separated by a dike is then graded, for which a special tool much like a hoe but heavier and sharp is used. The high places are cut down and the low places filled in, thus permitting flooding with a minimum supply of water in the shortest time, as well as an even development of the fruit.

Sanding. We must then cover the graded area with clean sand free from clay, loam, or seeds to a depth of from four to six inches according to the nature of the soil. This, as all other work on a cranberry bog, must be done by hand. The usual practice is with wheelbarrows over moveable planks. Care must be taken not to tread this sand into the peat and also to spread it to a uniform depth.

Planting. Seeds are used for originating new varieties. Meadows are established by planting cuttings from ten to fifteen inches long laid flat on the ground from ten to twenty inches apart each way. Then with a dibble placed in the middle of the cutting force the plant doubling upon itself through the sand into the peat.

The vines will then show above the sand one or two inches. The cuttings are obtained from vigorous plants by mowing a portion of a producing bog. A fully developed plant is about six inches high, the vines running along on the ground very similar to strawberries.

Time to plant. The best results have been obtained by planting during the months of April and May. The plants will then get a good start before the dry weather of the summer and the fourth year afterwards the first real crop may be expected. After this we generally expect a crop of fifty barrels per acre.

Cultivating. During the four years after the bog is built a large amount of work is involved to keep the area weeded and free from grass or other foreign growth. It is also necessary to clean out the ditches by the third year any way, as their banks have not been fully vined over and consequently the wash and caving will often fill them.

After the vines have completely covered the bog there is little trouble from weeds or other foreign growth.

Pruning. Each year, after harvesting, the bog is pruned with a razor-toothed rake removing all loose runners and leaving the vines in condition to produce uprights upon which the fruit grows.

Resanding. About every other year it is desirable to spread upon the surface of the bog a thin layer of sand. This also must be done by hand, unless as some growers and under certain conditions, may make the application on the ice in the winter.

Management. The cranberry industry is one of the most highly developed fruit specialties in the country. To be successful it requires years of experience and study and the demands in this respect are increasing every year.

Harvesting. Formerly cranberries were harvested by hand. Since the industry has expanded however, certain devices have been invented, only a few of which have stood the test of time and experience.

The month of September is really the harvesting month. It may begin in August and some times extends into October. The fruit as harvested is placed in ventilated boxes usually containing one bushel, in which they are carried to the packing house and there allowed to remain until properly cooled, after which they are put through certain machines for removing leaves, vines, soft and

injured fruit. From these machines they pass to belts or tables, to be picked over by hand. From here they pass into barrels containing one hundred pounds.

During this same time the berries are graded according to size, color, quality, etc.

Marketing. While there are still some independent growers who sell their own berries depending on locating their own markets, or through commission men, the larger part of the berries are sold through a coöperative association of the growers. The different grades of berries are given brands, which brand name indicates certain specifications in size, color, quality, and variety. This coöperative organization does the work at actual cost to the grower, maintaining offices and in all ways carries on the business as usually followed by coöperative associations. It has proven very successful and a great benefit to the business.

Formerly there was little care on the part of the consumers as to the kind of berries received, all cranberries being alike to them. In recent years, however, the markets are growing more and more particular demanding car loads of an even grade, quality, and pack of fruit.

Insect enemies. There are three classes of insects, those that attack the fruit, the vine, and the root, to combat which the main reliance is upon water. A bog that has no water must depend upon spraying with poisons.

In conclusion let me express the hope that the time is not far distant when Massachusetts will appreciate more than she does now, the importance of this highly specialized industry within her borders. The next ten years should reach a crop of five hundred thousand barrels a year and an average selling price of six dollars per barrel should mean three million dollars annually and nearly all of it is money coming into the State, for this is the one big crop in Massachusetts which is exported. A cheap and healthful food, which should be used more liberally in every family because of its food and medicinal value, its economy and the many uses to which it can be put, for there are few foods which lend themselves to so universal a use in cooking as cranberries.

TRANSACTIONS

OF THE

Massachusetts Horticultural Society

FOR THE YEAR 1917

PART II

BOSTON
PRINTED FOR THE SOCIETY
NINETEEN HUNDRED AND EIGHTEEN

Massachusetts Horticultural Society.

1917.

The Transactions of the Society are issued annually in two parts under the direction of the Committee on Lectures and Publications.

Communications relating to the objects of the Society, its publications, exhibitions, and membership, may be addressed to William P. Rich, Secretary, Horticultural Hall, No. 300 Massachusetts Avenue, Boston, Massachusetts.

Fred A. Wilson, *Chairman* Leonard Barron Nathn'l T. Kidder	*Committee on Lectures and Publications.*

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TRANSACTIONS

OF THE

Massachusetts Horticultural Society.

1917, PART II.

REPORT OF THE BOARD OF TRUSTEES FOR THE YEAR 1917.

The Board of Trustees of the Massachusetts Horticultural Society presents herewith to the members a summary of the business transacted at its meetings during the year 1917.

January 8. Walter Hunnewell was appointed Treasurer of the Society and William P. Rich Secretary, Librarian, and Superintendent of the Building for the current year. James Wheeler was appointed Superintendent of Exhibitions for the year with a salary of $300.00.

Appropriations were voted as follow:

For the library $400.00, in addition to the income of the French and Farlow Funds, and the unexpended balance of the appropriation for the previous year. For lectures for the year 1918, $500.00, to include the income of the John Lewis Russell Fund.

It was voted to refer the matter of appropriations for prizes and gratuities for the year 1918 to the Advisory Committee with power.

The President spoke of the desirability of increasing the membership of the Society and it was voted to refer the matter to the Advisory Committee for such action as it may deem best.

Mr. Farquhar suggested the importance of announcing the

exhibitions of the Society a year or two in advance and said that the matter might safely be referred to the Advisory Committee to prepare the schedule of exhibitions accordingly. On motion of Mr. Farquhar it was voted to refer the preparation of the schedule to the Advisory Committee.

Mr. Allen reported briefly on the preparations for the outdoor exhibition of June next. He stated that contracts had been given out for construction purposes and the necessary tents engaged. Also that the John Waterer Sons Co. of London had offered to send 250 tubs of rhododendrons for this exhibition. It was voted that the custom duties on this importation be paid by the Society.

October 11. A vote of thanks was tendered to Mr. Allen for his services on the occasion of the June Outdoor Flower Show.

A communication from William Robinson of Sussex, England, was read, expressing his thanks for the award of the George Robert White Medal of Honor for the year 1916.

A communication from the American Peony Society was presented, offering a Silver Medal for the largest and best collection of peonies at the Peony Exhibition of 1918. It was voted to accept the offer with thanks and to refer it to the Committee on Prizes and Exhibitions to be listed in the 1918 Schedule.

A letter from the Secretary of the American Dahlia Society was read, in reference to the schedule of prizes to be offered at the joint exhibition of September, 1918. It was voted, on motion of Mr. Roland, that each society publish its own schedule but the schedule of the visiting society must conform in its rules and regulations to those of the Massachusetts Horticultural Society.

A notice from the Massachusetts State Board of Agriculture was read, stating that incorporated agricultural societies were allowed to distribute $400.00 of the state bounty of $1000.00 in premiums to children and youths under eighteen years of age for horticultural and agricultural exhibits.

It was voted that an appropriation not exceeding $400.00 be made for the 1918 exhibition of the products of children's gardens.

The special committee appointed by the President to present a list of the various committees of the Society for the ensuing year reported as follows:

Committees for 1918.

Finance:— Walter Hunnewell, Chairman, Arthur F. Estabrook, Stephen M. Weld.

Membership:— Thomas Allen, George E. Barnard, Charles W. Moseley, Thomas Roland, Richard M. Saltonstall.

Prizes and Exhibitions:— James Wheeler, Chairman, Robert Cameron, William N. Craig, Duncan Finlayson, T. D. Hatfield.

Plants and Flowers:— William Anderson, Chairman, Arthur H. Fewkes, S. J. Goddard, Donald McKenzie, William Sim.

Fruits:— Edward B. Wilder, Chairman, William N. Craig, Isaac H. Locke, James Methven.

Vegetables:— John L. Smith, Chairman, Edward Parker, William C. Rust.

Gardens:— R. M. Saltonstall, Chairman, John S. Ames, David R. Craig, William Nicholson, Charles Sander, Charles H. Tenney.

Library:— C. S. Sargent, Chairman, E. B. Dane, N. T. Kidder.

Lectures and Publications:— F. A. Wilson, Chairman, Thomas Allen, J. K. M. L. Farquhar.

Children's Gardens:— Henry S. Adams, Chairman, Dr. Harris Kennedy, Mrs W. Rodman Peabody, Miss Margaret A. Rand, James Wheeler.

It was voted that the list as presented by the committee be accepted as the committees of the Society for the ensuing year.

William P. Rich,
Secretary.

REPORT OF THE COMMITTEE ON PRIZES AND EXHIBITIONS FOR THE YEAR 1917.

By James Wheeler, Chairman.

The exhibitions of the year 1917 have been very satisfactory, the quality excellent, the competition good, and the public interest well sustained.

The Spring Flower Show in March will go on record as the best ever held by the Society. Every available space was filled and the quality of the exhibits was above the standard. It was very gratifying to the officers of the Society to have the hearty cooperation of the owners of large private estates, the commercial growers, and the retail florists. The fruit and vegetable growers also put forth special effort to make their exhibits as attractive as possible. The public appreciated this excellent show and the attendance was larger than at any previous exhibition.

Your committee prepared the 1918 Schedule with prizes amounting to $8500.00, introducing many new features. While we wish to keep up the high standard of excellence of standard varieties, we desire to stimulate more interest in new fruits, vegetables, plants, and flowers.

Owing to the reduction of income and increased expenses the Advisory Committee recommended the cutting down of exhibitions and prizes. After carefully considering the situation we agreed that there was a call for every member of the Society to cooperate with our Government and to do our duty as a Society. The Committee, therefore, decided to have the exhibitions for the year 1918 as originally planned but to eliminate all money prizes, and further, to charge an admission fee to all the exhibitions beginning with the Spring Show, the net receipts to be given to the Red Cross or other war relief work.

We trust this action will meet with the hearty approval of the

members and that every one will make a special effort to make the exhibitions of 1918 the best in the history of the Society.

JAMES WHEELER
JOHN K. M. L. FARQUHAR
DUNCAN FINLAYSON
T. D. HATFIELD
THOMAS ROLAND

Committee on Prizes and Exhibitions.

REPORT OF THE COMMITTEE ON PLANTS AND FLOWERS FOR THE YEAR 1917.

By William Anderson, Chairman.

On January 13, S. J. Goddard was awarded a Silver Medal for Carnation Doris. A First Class Certificate of Merit was awarded to F. Dorner & Sons Co. for Laddie, a large flesh-pink, superior to existing varieties of that color. The same firm also exhibited Rosalie, a fine dark-pink of perfect form for which a Certificate of Merit was awarded. Fine spikes of Calanthe were exhibited by Duncan Finlayson.

February 3. Well grown Begonia Gloire de Lorraine and *Primula sinensis* were on exhibition, also a sport from Lorraine, large flower, light-pink color, tinged with salmon. A Silver Medal was awarded to George Melvin for a remarkably well-flowered plant of *Dendrobium nobile virginale.*

February 10, A. W. Preston, J. L. Smith, gardener, exhibited a very large flowered Brasso-Laelio-Cattleya, Seaforth Highlander, which received a Silver Medal.

The Spring Flower Show which opened on March 1st was one of the most successful ever held in Boston. In addition to the high quality of the exhibits, it was exceptional in its artistic arrangement. In the plant exhibits the outstanding features were the fine group of Acacias from Thomas Roland and the groups of Orchids from F. J. Dolansky, Julius Roehrs Co., and E. B. Dane. Many valuable and rare hybrids were included in the two latter groups while that of Mr. Dolansky was a massive group of especially well-flowered plants. The bulb displays were extensive and of high quality; especially fine were the new varieties of Darwin Tulips and Narcissus in the exhibits from the Weld garden and A. W. Preston. The Flemish garden arranged by R. and J. Farquhar & Co. which contained masses of bulbs, flowering shrubs, *Jasminum primulinum* and tall Cedars, all tastefully and effectively placed,

made an interesting and attractive feature of the show. This exhibit was awarded a Gold Medal.

The group of flowering and foliage plants, and of forced shrubs, Azaleas, Ericas, Clyclamen, Schizanthus, and Cinerarias, were notable features of the show and were of high quality. A Silver Medal was awarded to William Sim for collection of Auriculas, also a Silver Medal for hybrid Polyanthas. Thomas Roland received a Silver Medal for superior culture of Ericas and a similar award went to F. Dorner & Sons Co., for Carnation Laddie.

Awards of Honorable Mention were made to Charles Holbrow for his new seedling Rose, Christy Miller × President Taft; and to Charles S. Strout for seedling Carnation Snow White. Certificate of Merit was awarded to T. D. Hatfield for *Rhododendron lutescens*, a small-flowered yellow Rhododendron from Western China and to A. N. Pierson for Climbing Rose, Elizabeth Zeigler. A. N. Pierson was first for new foliage plant with *Adiantum gloriosum Lemkesii*, an improved *gloriosum*. Splendid vases of Richmond, Ophelia, Hadley, and Mrs. Bayard Thayer Roses were exhibited in the competitive classes. The winning varieties of Carnations were Pink Sensation, Pocahontas, Matchless, Benora, Doris, and Bella Washburn. The retail florists' displays were extensive and special prizes were awarded to Penn the Florist, H. R. Comley, Houghton Gorney Co., and the Boston Cut Flower Company.

Iris Show, May 26. On account of the backward season, very few flowers were staged at this exhibition. Miss Grace Sturtevant of Wellesley had a display of dwarf Iris and spring flowers; A. W. Preston, Narcissus; and Victor Heurlin, display of Narcissus and Tulips.

On June 19 members of the committee visited the Glen Road Iris gardens, Wellesley Farms, and made the following awards:

Iris Shekinah, (O × Celeste) × Self, a soft pale lemon yellow, deepening to the center, beard orange, the first yellow of Pallida type and height 3 feet, Silver Medal.

Iris Empire, (Monsignor × Aurea) Empire Yellow, 27 inches, with the excellent growth and shape of Monsignor, Certificate of Merit.

Iris Rosette, (Pallida × (Pallida, × Jeanne d'Arc) reddish violet with a strong tendency for both standards and falls to lie upon the horizontal, 3 feet, Certificate of Merit.

Iris True Charm (Oriflamme × Count de St. Clair) purest white with delicate fringe of blue-lavender, Style arms lavender, 3 feet, Certificate of Merit.

Iris Reverie, (Ann Leslie × Self) standards pale lilac, falls solid auricula-purple, 30 inches, Honorable Mention.

Iris Rose Madder, (Hector × Shelford Chieftain) Standards argyle-purple, falls velvety dahlia-purple, a 40 inch flexuous stem. Honorable Mention.

Iris Tangiers, (Oriflamme × Maori King) standards, light cinnamon-drab, falls black pansy-violet, 3 feet, Honorable Mention.

The Rose and Peony Show was postponed from June 23 to June 29. Peonies predominated and were of good quality. T. C. Thurlow's Sons of West Newbury had the largest exhibit which included 2000 blooms representing over 85 varieties including a few seedlings which had never been exhibited before. A Silver Medal was awarded this display. A similar award was given the Wellesley Nurseries for a collection of herbaceous Peonies.

E. J. Shaylor had on exhibition a very fine collection of Peony seedlings for which the following awards were made:

Wilton Lockwood, very large bloom of the semi-rose type, with very broad guard petals. The center petals are loosely arranged and intermixed with golden stamens. The center is prominently marked with a number of unusually broad carpeloides tipped with dark carmine-crimson. The general color of the flower is delicate rose with lighter tips to the petals. Awarded Certificate of Merit.

Frances Shaylor, large bloom of the semi-rose type with large guard petals and broad center petals. Those of the extreme center are surrounded with a row of golden stamens. Color a beautiful cream-white. Awarded Certificate of Merit.

Secretary Fewkes, a very large bloom of the rose type, with shell-like guard petals and collar of white staminodes. Center petals of equal length with the guard petals, making a very full, loosely arranged bloom. Color bluish-white. Awarded Certificate of Merit.

William F. Turner, large bloom of semi-rose type. Guards and center petals of same length with golden stamens in center. Color very deep, glowing crimson. Awarded Certificate of Merit.

Jessie Shaylor, semi-double type of bloom, with broad guard petals and loosely arranged center petals of same length, intermixed with golden stamens and occasional flecks of crimson on the carpeloides. Color white with tinge of salmon. Awarded Certificate of Merit.

No. 65, very large bloom of the bomb type, with broad reflexing guard petals, full to the center and making a very deep flower. The guard petals are hydrangea-pink, surrounded with a collar of blush-white and tipped with a crown of same color as the guard petals. Awarded Certificate of Merit.

Shaylor's Dream, semi-double type, nearly single. Guard petals long and eventually reflexing, pure white with large bunch of yellow stamens in center. Awarded Honorable Mention.

Alma, Japanese type, guard petals large with a prominent center of long staminodes with hooked ends, light yellow in color with golden tips. Well developed blooms show a prominent crown of pure white carpeloides with green blotches. Awarded Honorable Mention.

No. 35, semi-rose type bloom, with broad shell-like guard petals, with collar of broad and crimped petaloides, growing narrower toward the center which is composed of yellow stamens intermixed with a few very small petals. Color is pure satiny-white with a slight ivory tone. Awarded Honorable Mention.

A Certificate of Merit was awarded T. N. Cook for Climbing Rose, Bonnie Prince. In the competitive Rose classes the following varieties were the winners: Hybrid Perpetuals, Frau Karl Druschki, Ulrich Brunner, Captain Hayward, Margaret Dickson, Julius Margotten, White Baroness, John Hooper, Jean Liabaud, Duke of Edinburgh, Baroness Rothschild, Mrs. John Laing, Clio. Hybrid Tea Roses, Richmond, Lyons, Mrs. Charles Russell, Caroline Testout, Lady Ashtown, Countess Folkstone, Beauté de Lyon, William Shean, Mrs. Aaron Ward, Mary Countess of Ilchester, George Dickson, General McArthur, Augustus Hartman, Ophelia, Carola.

On July 7–8 the Sweet Pea Show was held in conjunction with the Sweet Pea Society of America. While the competition was not so strong as in former years the quality ruled high. Some fine new sorts were exhibited the best of which were the following:

Surprise, salmon, Edward Gondy, pink, Miriam Beaver, scarlet, Baltons Victory, lavender, Hope, vermilion pink, Hercules, cerise. Among the miscellaneous exhibits were fine collections of *Iris Kaempferi* from Iristhorpe Farm and wild flowers from Albert Davidson. F. W. Fletcher was awarded a Silver Medal for a fine collection of hybrid Delphiniums. The varieties Lassell Blue and a Belladonna hybrid were awarded Certificates of Merit.

July 21, the Bayard Thayer Estate at Lancaster exhibited *Lilium Thayerae* one of E. H. Wilson's new lilies from China. This was the first time this lily had been exhibited in this country. It is perfectly hardy, the flowers are recurved, of a rich orange color, and the petals are covered with small black spots, the stem strong and wiry, the best spike shown carrying 21 flowers and buds. It was awarded a Silver Medal.

The Gladiolus Show which opened on August 11, was not as large nor was the quality of the blooms as good as in former years, due no doubt to the excessively hot dry weather previous to the exhibition. Some of the winning varieties were Frau Elise Bergen, Loveliness, Goliath, Joe Colman, Myrtle, Charlemagne, Moonlight, Austrasia, Sphinx, Queen Wilhelmina, Elizabeth Kurtz, and Murillo. There was a good display of Phlox, some of the best of which were Maid Marion, Stella's Choice, Argon, La Feu de Mond, Paul Carpentier, Cameron, Africa, Elizabeth Campbell, Marquis de St. Paul. Special awards were Silver Medal to C. F. Fairbanks for *Gladiolus primulinus* hybrids; Silver Medal to the Boston Cut Flower Co., for an artistic arrangement of cut Gladioli in baskets and vases; Certificate of Merit to A. E. Kunderd for seedling Gladiolus Lily White.

Dahlia Show Sept. 8–9. The Dahlias exhibited at this show were of fine quality, although less numerous than usual. J. K. Alexander made an extensive exhibit of cut blooms, embracing all classes. The Boston Cut Flower Co. was awarded a Silver Medal for an artistic display of Dahlias and other flowers. Thomas Cogger received a First Class Certificate of Merit for Gladiolus Mrs. Keur, a very large flower, color deep pink. Old Town Nurseries exhibited a collection of seedling Gladioli which was awarded Honorable Mention. J. K. Alexander had a splendid display of his Colossal Dahlias. The Colossal type includes all the

giant-flowering Dahlias, intermediate between the broad, flat-petaled Decorative Dahlia and the common quilled Show Dahlia.

December 22. John L. Smith, gardener for A. W. Preston, was awarded a Gold Medal for Brasso-Cattleya, A. W. Preston (C. Enid × Brassavola Digbyana).

The pedigree of this orchid is as follows:

Cattleya Mossiae × C. gigas = Cattleya Enid.

Cattleya Enid × Brassavola Digbyana = Cattleya A. W. Preston.

The plants carried one flower and two buds. The flower is eight inches across and the labellum is four inches deep. Color rosy-lavender, throat purple veined, and shaded with yellow; staminode, cream white.

William Anderson Arthur H. Fewkes S. J. Goddard Donald McKenzie Arthur E. Griffin	*Committee on Plants and Flowers.*

BRASSO-CATTLEYA A. W. PRESTON

PRIZES AWARDED FOR PLANTS AND FLOWERS.

1917.

January 13.

John A. Lowell Fund.

Antirrhinums.— One vase of twelve spikes:
Mrs. C. G. Weld, Weld Pink, $3.
Carnation.— Any new variety of merit:
S. J. Goddard, Doris, Silver Medal.
Orchids.— Calanthes, twelve spikes:
Weld Garden, $5.

February 3.

John Allen French Fund.

Begonia Gloire de Lorraine.— Six plants:
1st, Mrs. J. L. Gardner, $10.
Primula sinensis.— Six plants:
1st, Mrs. J. L. Gardner, $6; 2d, A. M. Davenport, $3.

Spring Exhibition.

March 21, 22, 23, 24, and 25.

Acacias.— Group of plants in bloom not exceeding 200 sq. ft.:
1st, Thomas Roland, $100.
Three plants:
1st, Thomas Roland, $25.
One plant:
Thomas Roland, $10.
Amaryllis.— Twelve plants:
1st, Mrs. J. M. Sears, $20.
Astilbes.— Collection not exceeding 100 sq. ft., not less than six varieties:
1st, W. W. Edgar Co., $50.
Azaleas.— Indica, group not exceeding 200 sq. ft.:
1st, A. M. Davenport, $100; 2d, W. W. Edgar Co., $50.
Three plants:
1st, Miss Cornelia Warren, $20.

Chionodoxa.— Six 6 in. pans:
1st, Mrs. J. L. Gardner, $5.
Clivias (Imantophyllum).— Four plants:
1st, Faulkner Farm, $12.
Cinerarias.— Grandiflora type, six plants:
1st, Mrs. J. M. Sears, $15; 2d, E. A. Clark, $10.
Six plants:
Mrs. J. M. Sears, $5.
Stellata type, six plants:
1st, Mrs. J. L. Gardner, $15; 2d, Mrs. Robert Saltonstall, $10.
One plant:
Mrs. J. L. Gardner, $5.
Cyclamens.— Eight plants:
1st, Mrs. Lester Leland, $25; 2d, Mrs. J. L. Gardner, $15.
Eight plants, in not exceeding 7 in. pots:
1st, Mrs. J. L. Gardner, $20; 2d, Mrs. Lester Leland, $10.
Cytisus.— Four plants:
1st, Miss Cornelia Warren, $15.
One plant:
Miss Cornelia Warren, $5.
Ericas.— Six plants:
2d, Miss Cornelia Warren, $10.
Freesias.— Six pots:
1st, Mrs. C. G. Weld, $10; 2d, Mrs. J. L. Gardner, $5.
Galanthus (Snow Drops).— Six pots:
1st, Mrs. J. L. Gardner, $5; 2d, A. W. Preston, $3.
Grape Hyacinths.— Six pots:
1st, A. W. Preston, $10; 2d, Mrs. J. L. Gardner, $5.
Hyacinths.— Twelve pots, three bulbs of one variety in each:
1st, Weld Garden, $20; 2d, Mrs. J. L. Gardner, $10.
Six pots:
1st, Weld Garden, $10.
One pot, six bulbs of one distinct variety, Dark Blue or Purple:
1st, Weld Garden, King of the Blues, $5; 2d, Mrs. J. L. Gardner, King of the Blues, $3.
One pot, Light Blue:
1st, Weld Garden, Queen of the Blues, $5; 2d, Mrs. J. L. Gardner, Enchantress, $3.
One pot, Dark Pink or Red:
1st, Weld Garden, La Victoire, $5; 2d, Mrs. J. L. Gardner, La Victoire, $3.
One pot, Light Pink:
1st, Mrs. J. L. Gardner, Jacques, $5; 2d, Weld Garden, Gigantea, $3.
One pot, Yellow:
1st, Mrs. J. L. Gardner, City of Haarlem, $5; 2d, Weld Garden, City of Haarlem, $3.

One pot, White:
1st, Weld Garden, La Grandesse, $5; 2d, Mrs. J. L. Gardner, La Grandesse, $3.

HYDRANGEAS.— Group to cover not exceeding 150 sq. ft.:
1st, W. W. Edgar Co., $75; 2d, A. M. Davenport, $40.
Two plants, two varieties:
1st, A. M. Davenport, $15.
One plant:
A. M. Davenport, $10.

JONQUILS.— Six pots:
1st, A. W. Preston, $10; 2d, Mrs. J. L. Gardner, $5.

LILACS.— Six plants:
1st, Faulkner Farm, $15; 2d, W. W. Edgar Co., $8.

LILIES.— Group covering 50 sq. ft.:
1st, W. W. Edgar Co., $50.

LILY OF THE VALLEY.— Six pots:
1st, Mrs. C. G. Weld, $6; 2d, A. W. Preston, $4.

MARGUERITES.— Four plants:
1st, Mrs. C. G. Weld, $12; 2d, Faulkner Farm, $6.
One plant:
Mrs. C. G. Weld, $5.

NARCISSI.— Large Trumpet, ten pots:
1st, Weld Garden, $20; 2d, A. W. Preston, $10.
Five pots:
1st, A. W. Preston, $10; 2d, Weld Garden, $5.
Short Trumpet, ten pots:
1st, A. W. Preston, $15; 2d, Weld Garden, $10.
Five pots:
1st, A. W. Preston, $8; 2d, A. W. Preston, $4.
One pot, any Double variety:
1st, Weld Garden, $5; 2d, A. W. Preston, $3.

ORCHIDS.— Group of plants arranged for effect:
1st, F. J. Dolansky, $300 and Gold Medal; 2d, Julius Roehrs Co., $200 and Silver Medal.
Group arranged for effect (Commercial growers excluded):
1st, E. B. Dane, $100 and Gold Medal; 2d, Mrs. C. G. Weld, $65 and Silver Medal.
Six plants, six varieties:
1st, J. T. Butterworth, $25.
One plant:
Miss Cornelia Warren, $10.

PALMS.— Two Kentias:
1st, Weld Garden, $15.
Two Phoenix Roebellini:
1st, Weld Garden, $15.

Primulas.— Acaulis, six plants:
1st, William Sim, $6.
Malacoides, eight plants:
1st, Mrs. C. G. Weld, $10; 2d, A. E. Parsons, $5.
Obconica, eight plants:
1st, William Whitman, $10; 2d, Mrs. C. G. Weld, $5.
Polyantha Hybrids, six plants:
1st, William Sim, $6; 2d, Mrs. C. G. Weld, $4.
Roses.— Rambler, one plant, Pink (Commercial growers excluded):
1st, Miss Cornelia Warren, Tausendschon, $10.
Schizanthus.— Six plants:
1st, E. S. Webster, $15; 2d, Miss Cornelia Warren, $10.
One plant:
Faulkner Farm, $5.
Scilla campanulata.— Four pans:
1st, Mrs. J. L. Gardner, $5.
Tulips.— Single Early, twelve pans, twelve distinct varieties:
1st, A. W. Preston, $20; 2d, Weld Garden, $10.
Six pans, one distinct variety in each:
1st, A. W. Preston, $10; 2d, Mrs. J. L. Gardner, $5.
One pan, Bicolor:
1st, A. W. Preston, Cerise Gris-de-lin, $5.
One pan, Pink:
1st, A. W. Preston, Flamingo, $5; 2d, Weld Garden, Pink Beauty, $3.
One pan, Pink and White:
1st, A. W. Preston, Queen of the Netherlands, $5.
One pan, Red:
1st, A. W. Preston, Brilliant Star, $5; 2d, A. W. Preston, La Grandeur, $3.
One pan, Red and Yellow:
1st, A. W. Preston, Keizerkroon, $5.
One pan. White:
1st, A. W. Preston, White Hawk, $5; 2d, Weld Garden, Joost Van Vondel, $3.
One pan, Yellow:
1st, A. W. Preston, Rising Sun, $5.
Double, six pans, six distinct varieties:
1st, Weld Garden, $10; 2d, A. W. Preston, $5.
One pan, Pink:
1st, Weld Garden, Murillo, $5; 2d, A. W. Preston, La Grandesse, $3.
One pan, Red:
1st, A. W. Preston, Vuurbaak, $5.
One pan, Yellow:
1st, A. W. Preston, Lady Godiva, $5.
Darwin, twelve pans, one variety in each:
1st, Weld Garden, $20.

Hyacinths.— Six plants in one or more pots (For amateurs only):
1st, Miss M. A. Rand, Queen of the Pinks, $5; 2d, Miss M. A. Rand, Queen of the Blues, $3.

Narcissi.— Twelve plants in one or more pots (For amateurs only):
1st, Miss M. A. Rand, King Alfred, $5; 2d, Miss M. A. Rand, Glory of Leiden, $3.

Tulips.— Twelve plants in one or more pots (For amateurs only):
1st, Miss M. A. Rand, Vermilion Brilliant, $5; 2d, Miss M. A. Rand, White Joost Van Vondel, $3.

Collection of Forced Bulbs.— To cover not more than 12 sq. ft. (For amateurs only):
1st, Miss M. A. Rand, $10; 2d, Miss M. A. Rand, $8.

Artistic Display of Foliage and Flowering Plants.— To cover not exceeding 200 sq. ft.:
1st, A. M. Davenport, $100; 2d, W. W. Edgar Co., $65.

General Display of Spring Bulbous Plants.— Arranged for effect with foliage plants:
1st, Weld Garden, $75; 2d, Mrs. J. L. Gardner, $40.

Collection of Forced Shrubs.— To cover 150 sq. ft.:
1st, A. M. Davenport, $60. 2d, Faulkner Farm, $30.

Hard-wooded Greenhouse Plants.— Group not exceeding 100 sq. ft.:
1st, Mrs. C. G. Weld, $50; 2d, Miss Cornelia Warren, $25.

Any other Plant in Flower, not mentioned in this list:
E. S. Webster, *Gloriosa Rothschildiana*, $8.

Any New or Rare Plant in Flower:
A. W. Preston, Laelio-Cattleya L. C. Black, $8.

Any New or Rare Foliage Plant:
Cromwell Gardens, *Adiantum gloriosum Lemkesii*, $8.

Special Prizes Offered by Messrs. Zandbergen Bros., Valkenburg, Holland.

Collection of Bulbs.— (For private gardeners only):
Weld Garden, $20.

Society's Prizes.

Antirrhinums.— One vase, twenty-five spikes, one or more varieties:
1st, W. R. Nicholson, Phelps White, $8; 2d, Mrs. C. G. Weld, mixed varieties, $4.

Camellias.— Collection of twelve blooms:
1st, Mrs. J. M. Sears, $5; 2d, A. Mathews, $3.

Carnations.— Vase of one hundred cut blooms of one variety, with foliage:
1st, A. A. Pembroke, Pink Sensation, $15; 2d, Littlefield & Wyman, Abington, $10.

Fifty blooms, any named Crimson variety:
1st, J. W. Minott Co., Pocahontas, $8.
Fifty blooms, Dark Pink:
1st, A. A. Pembroke, Rosette, $8; 2d, Littlefield & Wyman, Miss . Theo, $4.
Fifty blooms, Light Pink:
1st, A. A. Pembroke, Pink Sensation, $8; 2d, A. A. Pembroke, Pink Delight, $4.
Fifty blooms, Scarlet:
1st, Littlefield & Wyman, Belle Washburn, $8; 2d, A. A. Pembroke, Champion, $4.
Fifty blooms, Variegated:
1st, James Wheeler, Benora, $8; 2d, A. A. Pembroke, Benora, $4.
Fifty blooms, White:
1st, Strouts, Matchless, $8; 2d, Betty K. Farr, Matchless, $4.
Fifty blooms, Yellow:
1st, Betty K. Farr, Yellow Prince, $8.
Twenty-five blooms, any undisseminated variety:
1st, A. A. Pembroke, Seedling No. 10, $8; 2d, W. D. Howard, Bernice, $4.
Twenty-five blooms, Pink (for private gardeners only):
1st, Mrs. Frederick Ayer, $5.
Twenty-five blooms, Scarlet (for private gardeners only):
1st, Mrs. C. G. Weld, Beacon, $5; 2d, Mrs. Frederick Ayer, $3.
Twenty-five blooms, Variegated (for private gardeners only):
1st, W. H. Wellington, $5; 2d, N. S. Seavey, $3.
Twenty-five blooms, White (for private gardeners only):
1st, Mrs. C. G. Weld, Matchless, $5; 2d, W. H. Wellington, White Wonder, $3.
Fifty blooms, mixed varieties (for private gardeners only):
1st, A. W. Preston, $8; 2d, Mrs. Frederick Ayer, $4.

Freesias.— One hundred sprays:
1st, Mrs. C. G. Weld, $6; 2d, A. E. Parsons, $3.

Gardenias.— Twelve blooms:
1st, E. B. Dane, $5; 2d, Mrs. C. G. Weld, $3.

Marguerites.— One hundred blooms, Yellow:
1st, James Wheeler, $8.

Mignonette.— Twelve spikes:
1st, W. R. Nicholson, $5; 2d, Mrs. C. G. Weld, $3.

Orchids.— Collection of blooms, arranged for effect, with any foliage:
1st, F. J. Dolansky, $40; 2d, E. B. Dane, $20.

Pansies.— One hundred blooms:
1st, Osgood Bros., $5.
Display of Pansies:
1st, Osgood Bros., $10.

Roses.— Tea or Hybrid Tea, twenty-five blooms, Dark Pink:
1st, Waban Rose Conservatories, Lady Alice Stanley, $20.

Twenty-five blooms, Light Pink:
1st, A. N. Pierson Inc. Ophelia, $20; 2d, Waban Rose Conservatories, Ophelia, $10.
Twenty-five blooms, Red:
1st, Waban Rose Conservatories, Hadley, $20; 2d, Thomas Roland, Richmond, $10.
Twenty-five, any other color:
1st, Waban Rose Conservatories, Mrs. Bayard Thayer, $20.

Sweet Peas.— Twenty-five blooms, Lavender:
1st, Burtt the Florist, Mrs. M. Spanolin, $5.
Twenty-five blooms, Light Pink:
1st, Thomas Roland, Mrs. A. A. Skach, $5; 2d, Axel Magnuson, Yarrawa, $3.
Twenty-five blooms, Pink:
1st, Thomas Roland, Christmas Pink Orchid, $5; 2d, Burtt the Florist, Yarrawa, $3.
Twenty-five blooms, White:
1st, Thomas Roland, $5.
Twenty-five blooms, any other color:
1st, Burtt the Florist, Concord Winsome, $5.

Violets.— Bunch of one hundred blooms of any single variety:
1st, Edward Bingham, Princess of Wales, $5; 2d, William Sim, Princess of Wales, $3.

Cut Flowers.— Artistic arrangement:
Boston Cut Flower Co., $50; Penn the Florist, $50; Henry R. Comley, $50; Houghton & Gorney Co., $35; Caplan the Florist, $35; Iristhorpe Farm, $10.

Rose, Peony, and Strawberry Exhibition.

June 30 and July 1.

John C. Chaffin Fund.

Roses.— Best three blooms of White Hybrid Perpetual Roses (for amateurs only).
1st, Mrs. B. D. Harris, Frau Karl Druschki, $4; 2d, A. L. Stephen, Frau Karl Druschki, $2.
Best three blooms of Pink Hybrid Perpetual Roses (for amateurs only):
1st, Mrs. B. D. Harris, Mrs. John Laing, $4; 2d, David Tyndall, $2.
Best three blooms of Red Hybrid Perpetual Roses (for amateurs only):
1st, Mrs. B. D. Harris, Ulrich Brunner, $4; 2d, J. B. Wills, Capt. Hayward, $2.
Twenty-four named varieties, one bloom of each:
1st, W. J. Clemson, $10; 2d, T. N. Cook, $8.

Twelve named varieties, one bloom of each:
1st, W. J. Clemson, $5.
Six named varieties, one bloom of each:
1st, J. B. Wills, $4; 2d, W. J. Clemson, $2.
Six vases, six blooms each, stems not less than one foot in length:
1st, W. J. Clemson, $10; 2d, T. N. Cook, $5.

Samuel Appleton Fund.

Hybrid Tea Roses.— Collection of twenty-five varieties, one bloom each:
1st, T. N. Cook, $15; 2d, J. B. Wills, $10.
Collection of twelve varieties, one bloom each:
1st, J. B. Wills, $10; 2d, T. N. Cook, $6.
Best three blooms of a Hybrid Tea introduced since 1914:
T. N. Cook, $5.
Six blooms, any White variety:
1st, William Gray, Kaiserin Augusta Victoria, $4; 2d, T. N. Cook, White Killarney, $2.
Six blooms, any Yellow variety:
1st, William Gray, Mrs. Aaron Ward, $4; 2d, T. N. Cook, Mrs. Wemyss Quinn, $2.
Six blooms, any Pink variety:
1st, J. B. Wills, Lady Ashtown, $4; 2d, William Gray, Mme, Segond-Weber, $2.
Six blooms, any Red variety:
1st, J. B. Wills, $3; 2d, David Tyndall, $2.

Special Prizes Offered by E. K. Butler.

Hybrid Tea Rose.— Best individual bloom of a Hybrid Tea Rose in the exhibition:
J. B. Wills, Florence Pemberton, $10.

John Allen French Fund.

Herbaceous Peonies.— Collection of twelve named varieties, double, one bloom of each:
1st, A. H. Fewkes, $6; 2d, Mrs. C. S. Minot, $3.
Six blooms Pink, six varieties, one bloom each:
1st, A. H. Fewkes, $4; 2d, Mrs. C. S. Minot, $2.
Six blooms White;
1st, A. H. Fewkes, $4; 2d, R. C. Morse, $2.

Sweet Williams.— Display, eighteen vases of three trusses each, not less than six varieties:

1st, Miss Cornelia Warren, $6; 2d, W. C. Winter, $4.

Hardy Herbaceous Flowers.— Twenty-five vases, distinct species and varieties:

1st, Faulkner Farm, $10.

Perennial Larkspurs.— Twelve vases, three spikes each:

1st, F. W. Fletcher, Fletcher Hybrids, $6.

Sweet Pea Exhibition.

July 7 and 8.

Sweet Peas.— Twenty-five sprays, any White variety:

1st, Mrs. Robert Winthrop, Constance Hinton, $4; 2d, A. N. Cooley, Edna May Improved, $2.

Twenty-five sprays, Crimson or Scarlet:

1st, Mrs. Robert Winthrop, King Edward Spencer, $4; 2d, A. N. Cooley, Charity, $2.

Twenty-five sprays, Yellow:

1st, A. N. Cooley, Mrs. H. J. Damerum, $4; 2d, Mrs. Robert Winthrop, Mrs. H. J. Damerum, $2.

Twenty-five sprays, Blue:

1st, Mrs. Robert Winthrop, Blue Monarch, $4; 2d, A. N. Cooley, Blue Monarch, $2.

Twenty-five sprays, Blush:

1st, A. N. Cooley, Lady Evelyn Eyre, $4; 2d, Mrs. Robert Winthrop, Lady Evelyn Eyre, $2.

Twenty-five sprays, Deep Pink:

1st, A. N. Cooley, Hercules, $4; 2d, Edwin Jenkins, Hercules, $2.

Twenty-five sprays, Cream Pink:

1st, A. N. Cooley, Jean Ireland, $4; 2d, Iristhorpe Farm, Mrs. Breadmore, $2.

Twenty-five sprays, any Orange:

1st, Mrs. Robert Winthrop, May Unwin, $4; 2d, A. N. Cooley, May Unwin, $2.

Twenty-five sprays, any Lavender:

1st, Mrs. Robert Winthrop, Orchid Spencer, $4; 2d, Edwin Jenkins, King Mauve, $2.

Twenty-five sprays, any Purple:

1st, A. N. Cooley, Royal Purple, $4; 2d, Mrs. French Vanderbilt, Royal Purple, $2.

Twenty-five sprays, any Maroon:

1st, A. N. Cooley, King Manoel, $4; 2d, Iristhorpe Farm, King Manoel, $2.

Twenty-five sprays, any Striped of Flaked Red or Rose:
1st, A. N. Cooley, Jessie Cuthbertson, $4.

Iris Kaempferi.— Collection, not less than six varieties, filling twenty-five vases:
1st, Iristhorpe Farm, $8.

For Amateurs Only.

Sweet Peas.— Best vase, White, twelve sprays:
1st, W. G. Taylor, Constance Hinton, $2; 2d, Thomas Brook, Constance Hinton, $1.

Best vase Pink:
1st, W. G. Taylor, Hercules, $2; 2d, Mrs. P. G. Forbes, Elfrida Pearson, $1.

Best vase Dark Pink:
1st, Mrs. P. G. Forbes, Margaret Atlee, $2; 2d, Thomas Brook, Hercules, $1.

Best vase Lavender:
1st, Mrs. P. G. Forbes, Florence Nightingale, $2; 2d, Margaret J. Miller, Florence Nightingale, $1.

Best vase Salmon:
1st, W. G. Taylor, Barbara, $2; 2d, Mrs. P. G. Forbes, Robert Sydenham, $1.

Best vase Crimson:
1st, Thomas Burrows, Sunproof Crimson, $2; 2d, Margaret J. Miller, King Edward, $1.

Best vase Primrose:
1st, Thomas Burrows, Primrose Spencer, $2; 2d, Mrs. P. G. Forbes, Dobbie's Cream, $1.

Best vase Scarlet:
1st, Mrs. P. G. Forbes, Scarlet Emperor, $2; 2d, Margaret J. Miller, Fiery Cross, $1.

Best vase, any other color:
1st, Thomas Burrows, Royal Purple, $2; 2d, W. G. Taylor, Cherub, $1.

Wild Flowers.— Collection, named, one bottle of each kind:
1st, Albert Davidson, $5; 2d, Mrs. F. C. Upham, $4.

July 21.

Hollyhocks.— Twenty-four blooms, not less than four varieties:
1st, Mrs. C. Winter, $4; 2d, W. G. Kendall, $2.

Twelve spikes:
1st, Faulkner Farm, $4; 2d, W. G. Kendall, $2.

Gladiolus and Phlox Exhibition.

August 11 and 12.

Annuals.— General display, named, thirty species, filling one hundred bottles:
1st, Mrs. J. L. Gardner, $10.

Gladioli.— Twelve named varieties, one spike each:
1st, C. F. Fairbanks, $5; 2d, Jelle Roos, $3.

Vase of six spikes, Crimson, one variety:
1st, H. E. Meader, Black Beauty, $4; 2d, Jelle Roos, Goliath, $2.

Vase of six spikes, Pink:
1st, H. E. Meader, Myrtle, $4; 2d, S. E. Spencer, Mrs. Frank Pendleton, $2.

Vase of six spikes, Red:
1st, Jelle Roos, Aleida, $4; 2d, H. E. Meader, Jessie, $2.

Vase of six spikes, White:
1st, C. F. Fairbanks, Jessie Palmer, $4; 2d, Jelle Roos, Chicago White, $2.

Vase of six spikes, Yellow:
1st, C. F. Fairbanks, Ida, $4; 2d, Jelle Roos, Annie Wigman, $2.

Vase of six spikes, any other color:
1st, C. F. Fairbanks, Loveliness, $4; 2d, Jelle Roos, Herada, $2.

Vase of six spikes, any Primulinus Hybrid:
1st, Julia M. Fairbanks, $4; 2d, C. W. Brown, $2.

One vase, ten spikes, ten varieties (for amateurs only):
1st, Mrs. P. G. Forbes, $5.

Special Prizes Offered by C. F. Fairbanks.

Best seedling Gladiolus, one spike:
1st, Miss Fanny Foster, $25; 2d, Miss Fanny Foster, $10.

Collection of fifty named varieties, one spike of each:
1st, C. F. Fairbanks, $20; 2d, Jelle Roos, $10.

Most artistic display, covering 200 sq. ft.:
2d, C. W. Brown & Son, $20.

Most artistically arranged basket:
Boston Cut Flower Co., $10.

Josiah Bradlee Fund.

Perennial Phloxes.— Twelve named varieties, one truss of each:
1st, T. C. Thurlow's Sons Co., $5.

Twelve trusses, named varieties (commercial growers excluded):
1st, Oliver Ames, $8.
Six trusses, one variety:
T. C. Thurlow's Sons Co., Maid Marion, $5.

Dahlia and Fruit Exhibition.

September 8 and 9.

Dahlias.— Show and Fancy, twelve blooms, named varieties:
1st, J. K. Alexander, $3; 2d, Forbes & Keith, $2.
Cactus, twelve blooms, named varieties:
1st, J. K. Alexander, $3; 2d, W. D. Hathaway, $2.
Decorative, twelve blooms, named varieties:
1st, W. D. Hathaway, $3; 2d, J. K. Alexander, $2.
Peony-flowered, twelve blooms, named varieties:
1st, J. K. Alexander, $3; 2d, W. D. Hathaway, $2.
Pompon, twelve vases of three blooms each, named varieties:
1st, J. K. Alexander, $3; 2d, W. D. Hathaway, $2.
Single, twelve vases of three blooms each:
1st, J. K. Alexander, $3.
Largest and best collection of named varieties, one vase of each:
1st, J. K. Alexander, $8; 2d, Forbes & Keith, $6.
Hardy Herbaceous Flowers.— Thirty bottles, distinct species and varieties, not less than ten genera (commercial growers excluded):
1st, Faulkner Farm, $10.
Wild Plants.— Collection in flower or fruit, one bottle of each kind:
1st, Mrs. F. C. Upham, $5.

Gold Medal.

March 21. R. & J. Farquhar & Co., Flemish Garden.
" " Julius Roehrs Co., Collection of Choice and Rare Orchids.
June 2. James Wheeler, for installing June Outdoor Exhibition.
" " R. & J. Farquhar & Co., Rock Garden.
" " Thomas Roland, Rose Garden.
" " Charles Sander, Collection of Azaleas and Wisterias.
" " John Waterer Sons & Crisp, Ltd., Collection of Rhododendrons.
" " Mrs. Samuel C. Lawrence, Rhododendrons.
" " T. D. Hatfield, Exhibit of Rhododendrons.
" " Julius Heurlin, Exhibit of Evergreen Trees.

June 2. A. N. Cooley, Exhibit of Orchids.
" " E. B. Dane, " " "
" " Julius Roehrs Co., " " "
" " F. J. Dolansky, " " "
December 22. A. W. Preston, Brasso-Cattleya A. W. Preston.

Silver Medal.

February 3. George Melvin, Superior Cultivation of *Dendrobium nobile virginale.*
" 10. A. W. Preston, Brasso-Laelio-Cattleya Seaforth Highlander.
March 21. William Sim, Garden Arrangement of Auriculas.
" " Thomas Roland, Superior Cultivation of Ericas.
" " F. Dorner & Sons Co., Carnation Laddie.
" " William Sim, Display of Polyantha Hybrids.
June 2. Mrs. C. G. Weld, Flowering Plants.
" " Faulkner Farm, " "
" " E. S. Webster, " "
" " William Sim, Display of Pansies.
" " Mt. Desert Nurseries, Collection of Astilbes.
" " J. T. Butterworth, Collection of Orchids.
" 19. Miss Grace Sturtevant, Iris Shekinah.
" 30. T. C. Thurlow's Sons Co., Collection of Herbaceous Peonies.
" " Wellesley Nurseries. " " " "
July 7. F. W. Fletcher, Collection of Seedling Delphiniums.
" 21. Mrs. Bayard Thayer, *Lilium Thayerae.*
August 11. C. F. Fairbanks, Display of Gladiolus Primulinus Hybrids.
" " Boston Cut Flower Co., Artistic Arrangement of cut Gladioli in baskets and vases.
September 8. Boston Cut Flower Co., Artistic Display, showing the various ways Dahlias and other flowers may be used for home decoration.

First Class Certificate of Merit.

January 13. F. Dorner & Sons Co., Carnation Rosalie.
" " " " " " " " Laddie.
March 21. A. N. Pierson Inc., New Hardy Climbing Rose Elizabeth Ziegler.
" " Walter Hunnewell, *Rhododendron lutescens.*
" " William Sim, Improved Blue Primrose.
June 2. P. L. Carbone, Exhibit of Garden Accessories.
" " J. Whittier, Exhibit of Garden Furniture.
" " Henry Penn, Exhibit of Garden Ornaments.

June 19. Miss Grace Sturtevant, Iris Empire.
" " " " " " Rosette.
" " " " " " True Charm.
" 30. T. N. Cook, Climbing Rose Bonnie Prince.
" " E. J. Shaylor, Seedling Peony Wilton Lockwood.
" " " " " " " Wm. F. Turner.
" " " " " " " Frances Shaylor.
" " " " " " " No. 65.
" " " " " " " Jessie Shaylor.
" " " " " " " Secretary Fewkes.
July 7. F. W. Fletcher, Delphinium Belladonna Hybrid Sir Kenneth.
" " " " " " " " Lasell Blue.
August 11. A. E. Kunderd, Seedling White Gladiolus Lilywhite.
" 25. R. W. Swett, Seedling Gladiolus Beacon.
September 8. Thomas Cogger, Gladiolus Mrs. Keur.

Cultural Certificate.

June 30. William Gray, Hybrid Tea Roses.

Honorable Mention.

February 3. Thomas Roland, Begonia, sport from Gloire de Lorraine.
" " A. E. Parsons, New Seedling *Primula malacoides*.
March 21. Mrs. J. M. Sears, Seedling Amaryllis.
" " C. E. Holbrow, New Seedling Rose (Christie Miller × President Taft).
" " N. T. Kidder, Isoloma Van Houttei.
" " A. W. Preston, Tulip President Wilson.
" " Lowthorpe School of Horticulture, Collection of Geraniums in bloom, new and standard varieties.
" " Walter Hunnewell, Group of *Acacia Drummondii*.
" " Mrs. L. A. Breck, Dutch Garden.
" " Strouts, Seedling White Carnation Snow White.
" " S. J. Goddard, Crimson Seedling Carnation No. 10.
June 2. E. A. Clark, Flowering Plants.
" " W. W. Edgar Co., " "
" " R. M. Saltonstall, Display of Petunia Bar Harbor Beauty.
" " S. M. Weld, Conifers and Flowering Plants.
" " Mrs. J. E. Thayer, Display of English Ivy in pots.
" " Miss Cornelia Warren, Orchids and Calceolarias.
" 19. Miss Grace Sturtevant, Iris Reverie.
" " " " " " Rose Madder.
" " " " " " Tangiers.

June 30. E. J. Shaylor, Seedling Peony No. 35.
" " " " " " " Shaylor's Dream.
" " " " " " " Alma, Japanese-flowered.
July 7. Mrs Lester Leland, New Achimenes Supreme.
" 21. J. H. Stalford, Seedling Antirrhinums.
August 11. Miss Fanny Foster, Seedling Gladioli.
" " G. N. Smith, Seedling Phlox Wellesley.
September 8. G. B. Gill, Seedling Decorative Dahlia Fitzhugh.
" " Old Town Nurseries, Collection of Seedling Gladioli.
" " Fottler, Fiske, Rawson Co., Display of Gladioli and Dahlia Flowers.
" " J. K. Alexander, Collection of Colossal Dahlias.

REPORT OF THE COMMITTEE ON FRUITS FOR THE YEAR 1917.

By Edward B. Wilder, Chairman.

The year has seemed to be out of season or we might say erratic from the standpoint of the fruit grower.

The Spring was very late, the Summer comparatively cool, and the usual heat for the first ten to fifteen days of September, so much needed for maturing the crops, was lacking.

The scheduled exhibitions of fruit have, however, been held, though sometimes the dates have been changed or the shows extended because of the conditions already referred to.

The Rose, Peony, and Strawberry Exhibition was postponed from June 23–24 to June 30–July 1 and entries not made on the latter dates were admitted at a Special Show, July 7–8. Considering the season there was a good display of berries, the arrangement of the fruit with its own foliage on the plates of the Society, still growing in favor with the people.

The Silver Medal for the best new strawberry of merit not yet introduced was awarded to Dr. Frederick S. De Lue of Needham for a seedling named Venia. Dr. De Lue says "this strawberry is medium early, very prolific, having a long season, and holding its size to the last."

The lateness of the season caused the postponement of the fruit exhibit at the Sweet Pea Exhibition from July 7–8 to July 21. The lack of peaches at the Dahlia and Fruit Exhibition, September 8–9, was very noticeable, entries being made in only two classes.

The event of the year was the Special Exhibition of Fruits, October 31–November 4, in conjunction with the Biennial Exhibitions of the American Pomological Society and the New England Fruit Show.

All the halls were used for exhibition purposes, the lectures and discussions being held in the hall in the basement. Eminent po-

mologists and fruit growers from Canada and many States in the Union took part in these meetings, vital subjects being discussed.

The exhibits under the schedule of the Massachusetts Horticultural Society were held in the lecture hall and small hall. The plate exhibits of apples were very good showing a wonderful improvement since the meeting with the American Pomological Society in 1903. Special interest was manifest in the collections of New England grown apples arranged for decorative effect with foliage, covering a space not to exceed 48 square feet.

In this class A. B. Howard & Son of Belchertown won first, Derby Farm, Leominster, second, and Wright A. Root, Easthampton, third prize.

There were two entries for the artistic display of New England grown fruits to cover 100 square feet. A. B. Howard & Son was awarded first prize for a beautiful and truly artistic display of fruit, embracing 15 varieties of apples, 10 of pears, 10 of plums, 3 of quinces, and 1 of peaches, all the fruit being of excellent quality. Wright A. Root took second prize with a hut decorated with apple boughs.

A new and interesting feature of the show was the class for the best 100 apples, there being 17 entries, all of which were good. For the best 100 Baldwin apples Thomas K. Winsor of Greenville, R. I., took first and Derby Farm second prize. For the best 100 McIntosh apples Derby Farm took first and C. C. Pettigrew, Mt. Vernon N. H., second prize. For the best 100 apples of any other variety Frank F. Brown of North Scituate, R. I., took first prize with 100 Northern Spy and Thomas K. Winsor second prize with 100 R. I. Greening. The collections of ten, five, and three varieties of apples were well represented, the whole display of apples in the exhibition being remarkably free from San José scale.

Considering the season of the year the exhibit of hardy grapes was remarkably fine. The first prize for best collection of ten varieties of grapes went to John Bauernfeind of Medford, second to Dr. W. G. Kendall of Atlantic. The new class for 25 bunches of hardy grapes brought out some excellent entries. Mrs. M. J. Merrill of Medford was awarded first prize for 25 bunches of Concord grapes, Dr. Kendall first prize for 25 bunches of Niagara, and John Bauernfeind second prize for 25 bunches of Delaware in the class for any other variety of grapes.

Honorable Mention was given Dr. Kendall for two bunches of Black Hamburg grapes, outdoor culture, the first ever shown here. This opens a new field of investigation in growing hothouse grapes in the open air. Mrs. John C. Whitin of Whitinsville (Wm. McAllister, gardener) displayed a collection of beautiful hothouse grapes and Mrs. J. M. Sears of Southboro (J. S. Doig, gardener) two bunches of Black Hamburg.

Pears were well represented, all classes being filled, the new class for the best 50 pears receiving marked attention. Dr. Kendall won the first prize for best 50 Bosc pears, Warren Heustis and Son, Belmont, first prize for best 50 Dana's Hovey pears, and F. W. Dahl of Roxbury first prize for any other variety, 50 Lawrence.

Among the exhibits of the American Pomological Society in the main hall were large collections of seedling apples from the Central Experimental Farm of Ottawa, Canada, under the charge of Professor William T. Macoun, also tables of apples from Virginia and North Carolina which attracted much attention on account of their size, color, and quality. A table of persimmons from North Carolina, consisting of many new varieties created great interest. This fruit, somewhat new to us for table use, is becoming popular in the market.

The great size of the pecan nuts from Georgia attracted much attention. These nuts have shells so thin that a lady can crack them with her gloved hand and they contain a wonderful amount of meat.

Great interest was manifest in the exhibits of the New England Fruit Show, representing all the New England States, and comprising hundreds of boxes and barrels of the finest apples equaling in size, color, and quality any fruit grown in this country. Considering the abnormal season the Fruit Committee feels that the exhibits of fruit have been good.

EDWARD B. WILDER
WILLIAM N. CRAIG
ISAAC H. LOCKE
JAMES METHVEN
Committee on Fruits.

PRIZES AWARDED FOR FRUITS.

1917.

January 13.

Theodore Lyman Fund, No. 1.

Apples.— One plate of Winter Apples:
A. B. Howard & Son, $4.
Pears.— One plate of Winter Pears:
F. W. Dahl, $4.

Spring Exhibition.

March 21, 22, 23, 24, and 25.

Benjamin V. French Fund, No. 2.

Winter Apples.— Collection of not less than four varieties:
1st, A. B. Howard & Son, $6; 2d, F. L. Chamberlain, $4.
Two plates:
1st, F. L. Chamberlain, $4; 2d, A. B. Howard & Son, $3.
Plate of one variety:
1st, F. L. Chamberlain, $3; 2d, F. L. Chamberlain, $2.
Pears.— Plate of any variety:
1st, John Bauernfeind, $3; 2d, F. W. Dahl, $2.

Rose, Peony, and Strawberry Exhibition.

June 30 and July 1.

Benjamin V. French Fund, No. 2.

Strawberries.— For the best collection of ten plates of 48 berries each, not less than six varieties:
1st, Wilfrid Wheeler, $15.
Two plates, 24 berries each, of any variety introduced since 1912:
1st, F. S. DeLue, Judith, $4.
Best two plates, 48 berries each, of any variety:
1st, F. S. DeLue, $8.

Best single plate of any variety, 24 berries:
1st, F. S. DeLue, $3; 2d, James Donald, $2.
Best new strawberry of merit not yet introduced, 48 berries:
F. S. DeLue, Venia, Silver Medal.
Two plates Abington, 24 berries each:
1st, Wilfrid Wheeler, $3.
Two plates Barrymore:
1st, H. L. Crane, $3.
Two plates Golden Gate:
1st, W. C. Cooper, $3.
Two plates Marshall:
1st, Louis Graton, $3; 2d, W. C. Cooper, $2.
Two plates any other variety:
1st, W. C. Cooper, Warren, $3; 2d, H. L. Crane, Howards, $2.
For the best new strawberry of recent introduction not previously exhibited before this Society, two plates, 24 berries each:
1st, Louis Graton, Edmund Wilson, $8.

Sweet Pea Exhibition.

July 7 and 8.

Strawberries.— Best three plates, 24 berries each, of any variety:
1st, G. V. Fletcher, $5; 2d, W. C. Cooper, $4.
Two plates William Belt:
1st, W. C. Cooper, $3.
Cherries.— Two plates, 24 specimens each, of any Red variety:
1st, E. B. Wilder, Downer, $3; 2d, F. W. Dahl, Early Red, $2.
Two plates, 24 specimens each, of any White or Yellow variety:
1st, F. W. Dahl, White Heart, $3.
Best fruited branch of Cherries:
1st, F. W. Dahl, White Heart, $3; 2d, F. W. Dahl, Early Red, $2.

July 21.

Theodore Lyman Fund, No. 1.

Raspberries.— Cuthbert, 96 berries:
1st, W. C. Cooper, $3.
Herbert:
1st, W. C. Cooper, $3.
Any White variety:
1st, E. B. Wilder, $3.
Cherries.— Any Red variety, 96 specimens:
1st, Faulkner Farm, $3; 2d, Sumner Smith, $2.

Any White or Yellow variety, 96 specimens:
1st, Mrs. M. J. Merrill, $3; 2d, F. W. Dahl, $2.
Any Black variety, 96 specimens:
1st, Faulkner Farm, $3; 2d, Sumner Smith, $2.

Society's Prizes.

Currants.— Fay's, 48 bunches:
1st, John Bauernfeind, $3, 2d, E. M. Brewer, $2.
Perfection:
1st, John Bauernfeind, $3; 2d, Mrs. C. G. Weld, $2.
Wilder:
1st, John Bauernfeind, $3.
Any other Red variety:
1st, E. M. Brewer, Cherry, $3.
White Grape:
1st, W. C. Winter, $3.
Any other White variety:
1st, John Bauernfeind, White Imperial, $3; 2d, W. C. Winter, White Dutch, $2.
Gooseberries.— Columbus, 48 berries:
1st, W. G. Kendall, $3; 2d, John Bauernfeind, $2.
Downing, 48 berries:
1st, W. G. Kendall, $3; 2d, John Bauernfeind, $2.
Industry, 48 berries:
1st, W. G. Kendall, $3; 2d, Samuel McMullen, $2.
Triumph, 48 berries:
1st, John Bauernfeind, $3.
Any other variety, 48 berries:
1st, W. G. Kendall, Chautauqua, $3; 2d, W. G. Kendall, Bates, $2.
Collection of six plates, 48 berries each, not less than three varieties:
1st, W. G. Kendall, $5; 2d, W. C. Winter, $4.

Gladiolus and Phlox Exhibition.

August 11 and 12.

Benjamin V. French Fund, No. 1.

Apples.— Best collection of Summer Apples:
2d, M. S. Wheeler, $8.
Best plate of Summer Apples:
1st, M. S. Wheeler, Red Astrachan, $3; 2d, G. V. Fletcher, Sweet Bough, $2.

Josiah Bradlee Fund.

Blackberries.— Any variety, 48 berries:
1st, W. C. Winter, Erie, $3; 2d, Mrs. Henry Lyman, Agawam, $2.
Blueberries.— One hundred berries:
1st, Jennison's Floral Gardens, $3; 2d, Mrs. Henry Lyman, $2.

Society's Prizes.

Peaches.— Six specimens:
1st, W. C. Winter, Fitzgerald, $5.

Dahlia and Fruit Exhibition.

September 8 and 9.

Apples.— Best collection of Fall Apples (commercial growers excluded):
1st, M. S. Wheeler, $10; 2d, Faulkner Farm, $5.
Best plate of Fall Apples:
1st, M. S. Wheeler, Red Astrachan, $3; 2d, H. A. Clark, Wealthy, $2.

Marshall P. Wilder Fund.

Native Grapes.— Three bunches, any variety:
1st, E. R. Farrar, Moore's Early, $3; 2d, M. B. Farrar, Moore's Early, $2.
Collection of five varieties, three bunches of each:
1st, E. R. Farrar, $5; 2d, John Bauernfeind, $4.

Society's Prizes.

Peaches.— Carman:
1st, H. A. Clark, $3; 2d, W. G. Kendall, $2.
Champion:
1st, M. B. Farrar, $3; 2d, E. R. Farrar, $2.

Marshall P. Wilder Fund.

Pears.— Bartlett:
1st, Mrs. Elbridge Torrey, $3; 2d, W. Heustis & Son, $2.
Clapp's Favorite:
1st, W. G. Kendall, $3; 2d, Mrs. Elbridge Torrey, $2.

Any other variety:
1st, E. B. Wilder, Brandywine, $3; 2d, John Bauernfeind, Flemish Beauty, $2.

Society's Prizes.

Plums.— Single plate of any variety other than Japanese:
1st, F. W. Dahl, $3; 2d, G. V. Fletcher, $2.
Japanese Plums.— Collection of not less than four varieties, twelve specimens of each:
1st, M. S. Wheeler, $5.
Single plate of any variety:
1st, Mrs. R. Goodnough, Abundance, $3; 2d, M. S. Wheeler, Hale, $2.
Melons.— Scarlet Flesh, three specimens:
1st, Robert Dunn, Honeydrop, $3; 2d, James Donald, Sutton's Scarlet, $2.

Special Exhibition of Fruits.

October 31, November 1, 2, 3, and 4.

Theodore Lyman Fund, No. 2.

Apples.— Alexander, twelve specimens:
1st, C. C. Pettigrew, $4.
Baldwin:
1st, E. N. Sawyer, $4; 2d, D. R. Miller, $2.
Ben Davis:
1st, The Chase Orchards, $4; 2d, A. H. Prouty, $2.
Black Gilliflower:
1st, F. L. Chamberlain, $4; 2d, W. A. Root, $2.
Blue Pearmain:
1st, Derby Farm, $4; 2d, The Chase Orchards, $2.
Delicious:
1st, C. L. Witherell, $4; 2d, A. B. Howard & Son, $2.
Esopus Spitzenburg:
1st, The Orchards, $4; 2d, C. L. Witherell, $2.
Fallawater:
1st, A. P. Smith, $4.
Fall Pippin:
1st, J. T. Geer, $4; 2d, A. B. Howard & Son, $2.
Fameuse:
1st, C. C. Pettigrew, $4; 2d, E. H. West, $2.

Garden Royal:
2d, I. M. Blood, $2.
Golden Russet:
1st, A. P. Smith, $4; 2d, The Chase Orchards, $2.
Gravenstein:
1st, Drew's Fruit Farm, $4; 2d, T. K. Winsor, $2.
Grimes Golden:
1st, The Orchards, $4.
Hubbardston:
1st, W. H. Atkins, $4; 2d, C. C. Pettigrew, $2.
Jacob's Sweet:
1st, Parker Bros., $4.
Jonathan:
1st, Derby Farm, $4; 2d, The Orchards, $2.
King:
1st, E. N. Sawyer, $4; 2d, A. B. Howard & Son, $2.
McIntosh:
1st, M. S. Wheeler, $4; 2d, E. N. Sawyer, $2.
Maiden's Blush:
1st, J. T. Geer, $4.
Mother:
1st, A. P. Smith, $4.
Newtown:
1st, Hillcrest Farm, $4.
Northern Spy:
1st, W. H. Conant, $4; 2d, The Orchards, $2.
Oldenburg:
1st, A. L. Fish, $4; 2d, The Orchards, $2.
Opalescent:
1st, G. V. Mead, $4; 2d, The Orchards, $2.
Palmer Greening:
1st, E. F. Adams, $4; 2d, F. L. Chamberlain, $2.
Peck Pleasant:
1st, T. K. Winsor, $4; 2d, Parker Bros., $2.
Pewaukee:
1st, W. A. Root, $4; 2d, C. C. Pettigrew, $2.
Porter:
1st, J. M. Schwartz, $4; 2d, W. A. Root, $2.
Pound Sweet:
1st, A. H. Prouty, $4.
Red Canada:
1st, A. B. Howard & Son, $4; 2d, Parker Bros., $2.
Red Russet:
1st, J. M. Schwartz, $4; 2d, A. L. Fish, $2.
Rhode Island Greening:
1st, W. A. Root, $4; 2d, A. B. Howard & Son, $2.

Roxbury Russet:
1st, Augustus Hemenway, $4; 2d, W. H. Atkins, $2.
St. Lawrence:
1st, F. L. Chamberlain, $4; 2d, M. J. Cain, $2.
Salome:
1st, J. T. Geer, $4; 2d, J. H. Prouty, $2.
Seek No Further:
1st, A. B. Howard & Son, $4; 2d, The Chase Orchards, $2
Stark:
1st, E. N. Sawyer, $4; 2d, A. L. Fish, $2.
Sutton:
1st, E. N. Sawyer, $4; 2d, I. M. Blood, $2.
Swaar:
1st, Parker Bros., $4.
Tolman Sweet:
1st, C. C. Pettigrew, $4; 2d, T. J. Geer, $2.
Twenty Ounce:
1st, C. C. Pettigrew, $4; 2d, H. A. Clark, $2.
Yellow Bellflower:
1st, R. H. Gardiner, $4; 2d, A. B. Howard & Son, $2.
Yellow Transparent:
1st, E. H. West, $4; 2d, A. L. Fish, $2.
Wagener:
1st, Drew's Fruit Farm, $4; 2d, The Orchards, $2.
Walbridge:
1st, W. H. Atkins, $4; 2d, A. B. Howard & Son, $2.
Wealthy:
1st, E. N. Sawyer, $4; 2d, A. B. Howard & Son, $2.
Winter Banana:
1st, E. N. Sawyer, $4; 2d, C. L. Witherell, $2.
Wolf River:
1st, C. C. Pettigrew, $4; 2d, A. H. Prouty, $2.
Any other variety:
1st, Hillcrest Farm, Stayman, $4; 2d, The Chase Orchards, King Pippin, $2.

Crab Apples.— Hyslop, twenty-four specimens:
1st, M. J. Cain, $4; 2d, W. A. Root, $2.
Transcendent:
1st, A. B. Howard & Son, $4.
Any other variety:
1st, J. T. Geer, Marengo, $4.

John S. Farlow Newton Horticultural Society Fund.

Pears.— Angouleme, twelve specimens:
1st, Mrs. Elbridge Torrey, $4; 2d, F. W. Dahl, $2.

Anjou:
1st, F. W. Dahl, $4.
Bosc:
1st, W. G. Kendall, $4; 2d, Wilfrid Wheeler, $2.
Clairgeau:
1st, F. W. Dahl, $4; 2d, A. B. Howard & Son, $2.
Dana Hovey:
1st, W. Heustis & Son, $4; 2d, W. G. Kendall, $2.
Lawrence:
1st, F. W. Dahl, $4; 2d, Edward Mayhofer, $2.
Louise Bonne de Jersey:
1st, F. W. Dahl, $4; 2d, A. B. Howard & Son, $2.
Seckel:
1st, F. W. Dahl, $4; 2d, I. M. Blood, $2.
Winter Nelis:
1st, F. W. Dahl, $4; 2d, A. B. Howard & Son, $2.
Any other variety:
1st, A. B. Howard & Son, Clapp's Favorite, $4; 2d, F. W. Dahl, Superfin, $2.

Theodore Lyman Fund, No. 2.

Grapes.— Agawam six bunches:
1st, John Bauernfeind, $4; 2d, E. F. Williams, $2.
Brighton:
1st, C. W. Libby, $4; 2d, W. G. Kendall, $2.
Concord:
1st, John Bauernfeind, $4; 2d, W. G. Kendall, $2.
Delaware:
1st, John Bauernfeind, $4; 2d, W. G. Kendall, $2.
Herbert:
1st, John Bauernfeind, $4; 2d, C. W. Libby, $2.
Moore's Diamond:
1st, W. G. Kendall, $4; 2d, C. W. Libby, $2.
Niagara:
1st, John Bauernfeind, $4; 2d, W. G. Kendall, $2.
Salem:
1st, John Bauernfeind, $4; 2d, W. G. Kendall, $2.
Wilder:
1st, John Bauernfeind, $4; 2d, E. A. Adams, $2.
Worden:
1st, John Bauernfeind, $4; 2d, W. G. Kendall, $2.
Any other variety:
1st, W. G. Kendall, Vergennes, $4; 2d, John Bauernfeind, Diana, $2.
Quinces.— Any variety, twelve specimens:
1st, I. H. Locke, $4; 2d, A. B. Howard & Son, $2.

Cranberries.— Collection of not less than four varieties, half-peck of each:
1st, A. D. Makepeace, $12.
Half-peck of any variety:
1st, A. D. Makepeace, Batchelder, $4; 2d, A. D. Makepeace, Centennial, $2.

John S. Farlow Newton Horticultural Society Fund.

Foreign Grapes.— Collection of four varieties, 2 bunches of each:
1st, Mrs. J. C. Whitin, $25; 2d, W. C. Winter, $15.
Any Black variety, two bunches:
1st, Mrs. J. M. Sears, $6.

Theodore Lyman Fund, No. 2.

Apples.— For the best collection of New England grown apples, arranged for decorative effect:
1st, A. B. Howard & Son, $30; 2d, Derby Farm, $20; 3d, W. A. Root, $10.
For the best one hundred Baldwin Apples:
1st, T. K. Winsor, $20; 2d, Derby Farm, $10.
For the best one hundred McIntosh Apples:
1st, Derby Farm, $20; 2d, C. C. Pettigrew, $10.
For the best one hundred of any other variety of Apples:
1st, F. F. Brown, Northern Spy, $20; 2d, T. K. Winsor, Rhode Island Greening, $10.

Additional Prizes.

For Artistic Display of New England Grown Fruit.— To cover 100 sq. ft.:
1st, A. B. Howard & Son, $75; 2d, W. A. Root, $35.
Apples.— For collection of ten named varieties, one plate of twelve specimens of each variety:
1st, The Orchards, $20; 2d, A. B. Howard & Son, $10.
For collection of five varieties:
1st, J. M. Schwartz, $10; 2d, A. B. Howard & Son, $5.
For collection of three varieties:
1st, W. A. Root, $6; 2d, A. P. Smith, $3.
Hardy Grapes.— Twenty-five bunches Concord:
1st, Mrs. M. J. Merrill, $15.
Twenty-five bunches of Green Mountain:
2d, M. E. Smith, $8.
Twenty-five bunches of any other variety:
1st, W. G. Kendall, Niagara, $15; 2d, John Bauernfeind, Delaware, $8.

Ten varieties, three bunches each:
1st, John Bauernfeind, $20; 2d, W. G. Kendall, $5.
Five varieties, three bunches each:
1st, C. W. Libby, $10.
Three varieties, three bunches each:
1st, John Bauernfeind, $6; 2d, C. W. Libby, $3.

Pears.— Fifty specimens:
1st, W. G. Kendall, $15; 2d, W. Heustis & Son, $8.
Dana Hovey:
1st, W. Heustis & Son, $15; 2d, W. G. Kendall, $8.
Any other variety:
1st, F. W. Dahl, Lawrence, $15; 2d, Wilfrid Wheeler, Seckel, $8.
Ten varieties, one plate of 10 specimens each:
1st, A. B. Howard & Son, $20; 2d, F. W. Dahl, $10.
Five varieties, one plate of twelve specimens each:
1st, F. W. Dahl, $10; 2d, A. B. Howard & Son, $5.
Three varieties, one plate of twelve specimens each:
1st, F. W. Dahl, $6; 2d, W. G. Kendall, $3.
For the largest specimen Apple:
A. B. Howard & Son, Scarlet Beauty, $10.
For the largest specimen Pear:
F. W. Dahl, Clairgeau, $10.
For the largest bunch of Hardy Grapes:
John Bauernfeind, Niagara, $10.

Preserved Fruits.— For the largest collection put up in glass:
1st, Hermine A. Schulz, $25; 2d, Mrs. A. E. Titchener, $12; 3d, Melita Crawley, $6.

Honorable Mention.

October 31. W. G. Kendall, Black Hamburg Grapes, outdoor culture.

REPORT OF THE COMMITTEE ON VEGETABLES FOR THE YEAR 1917.

By John L. Smith, Chairman.

The year 1917 in some respects has not been a successful one; the shortage of labor, due to conditions arising from the war, is largely responsible for this. The vegetables exhibited during the year were of the same high quality as in former years. No new vegetable was exhibited during the year 1917.

Our vegetable shows during the year, on the whole, were considered far behind other years. The gratifying feature of the year has been the revival of interest on the part of the people in general in agricultural matters. The people have manifested the desire to acquire knowledge concerning agriculture and to apply the same in the cultivation of any land owned or hired by them. This interest should be kept alive and everything should be done to assist those who desire to become interested in the cultivation of the soil.

The year that has just closed has been a remarkable one in many respects. It has witnessed the entry of our country into the great World War. It has also seen an awakening of interest among the people in agriculture. The pressing needs of the War have directed our attention to the study of the soil and its products. We are beginning to realize that the progress of a nation depends largely upon agriculture.

A generation ago, every family had its garden plot, with hens, pigs, and cows. The cost of living was small because it was not necessary for such a family to go into the market to buy its food products. This condition for some years has ceased. A man's time has been regarded as too valuable to devote to such work. We have been gradually divorcing ourselves from the soil, leaving its cultivation in the hands of men who do it merely for profit.

We have been accustomed too long to buy the necessaries of life at the store, and have lost all interest in the cultivation of the small plot of ground, a custom which, only a few years ago, was universal. A wonderful educational campaign, however, has been waged during the past year, directing the attention of the people to the necessity of utilizing all spare land for the purpose of raising crops, no matter how small in amount. This should be continued with intensified effort until the head of every family can say that a large percentage of the necessaries consumed by his family are produced by their joint personal efforts.

There is a wonderful opportunity to assist the people in this work for many are unfamiliar with the care necessary to secure proper results. This community is fortunate in having a society similar to ours. It should be our purpose to give freely information and advice to every person seeking it, so that there may be an intelligent application of effort to the raising of produce. We should assist, as a society and as individuals, in stimulating the people to take an interest in agricultural matters. The governmental departments are ably advising people as to the conservation of food for the purpose of eliminating all waste; let us, as an organization, do our part to increase the amount of the supply. The handling of the matter should be arranged in an orderly manner.

I can make no better suggestion than to have a committee, known as the "Committee, or Bureau, of Information." This committee should be prepared to furnish all information concerning the proper planting and care of the various vegetables, including, of course, the preparation of the soil for the planting of the seed. The whole resources of the Society, if necessary, should be pledged to this work. This does not mean that its activities in other branches should cease, but that they should be subject to the more pressing one of assisting in furnishing an adequate food supply for the Nation.

If our efforts do anything towards a revival of interest on the part of the people in the cultivation of the soil, we will have accomplished much. Our work along these lines will be as important to the Government and to the Nation as if we were actively engaged with the Army in matters more intimately connected with the prosecution of the War. It is a work to which we may well bend

our efforts, and when the present struggle is ended, it will be apparent that this work has done much in bringing it to a successful termination.

JOHN L. SMITH
EDWARD PARKER
WM. C. RUST
} *Committee on Vegetables.*

PRIZES AWARDED FOR VEGETABLES.

1917.

January 13.

Mushrooms.— Twelve specimens:
Miss Cornelia Warren, $4.
Tomatoes.— Twelve specimens:
Mrs. C. G. Weld, Sterling Castle, $4.

Spring Exhibition.

March 21, 22, 23, 24, and 25.

Cucumbers.— Four:
1st, J. W. Stone, White Spine, $4.
Lettuce.— Four heads:
1st, M. E. Moore, Tennisball, $4; 2d, H. M. Howard, Tennisball, $2.
Mushrooms.— Twelve specimens:
1st, A. W. Crockford, $4; 2d, G. A. Christofferson, $2.
Radishes.— Four bunches:
1st, A. W. Crockford, $4; 2d, J. W. Stone, $2.
Rhubarb.— Twelve stalks:
1st, D. R. Craig, $4.

Iris Exhibition.

May 26.

Lettuce.— Four heads:
1st, Miss E. B. Thacher, $4.

Rose, Peony, and Strawberry Exhibition.

June 30 and July 1.

Beets.— Twelve, open culture:
1st, W. Heustis & Son, Early Wonder, $4.
Cabbage.— Four specimens: 1st, W. Heustis & Son, Early Market, $4; 2d, W. Heustis & Son, Early Spring, $3.

Cucumbers.— Four specimens, White Spine:
1st, Oliver Ames, $4.
Four specimens English:
1st, W. J. Clemson, Telegraph, $4; 2d, Oliver Ames, Telegraph, $3.
Lettuce.— Four heads:
1st, James Donald, Ideal, $4; 2d, Oliver Ames, Big Boston, $3.
Four heads Cos or Romaine:
1st, W. J. Clemson, Trianon, $4; 2d, James Donald, Farquhar's Cos., $3.
Peas.— Gradus of Thomas Laxton, fifty pods:
1st, Oliver Ames, $4.
Sutton's Excelsior, fifty pods:
1st, E. L. Lewis, $4.
Any other variety, fifty pods:
1st, E. L. Lewis, Little Marvel, $4; 2d, James Donald, Farquhar's Prolific, $3.
Collection of Vegetables.— Ten varieties, tastefully arranged:
1st, W. J. Clemson, $15; 2d, Miss E. B. Thacher, $8.

Sweet Pea Exhibition.

July 7 and 8.

William J. Walker Fund.

Beans.— String, fifty pods:
1st, Miss E. B. Thacher, Black Valentine, $3.
Beets.— Twelve:
1st, W. Heustis & Son, Early Wonder, $3; 2d, Oliver Ames, Crosby's Egyptian, $2.
Cabbage.— Four specimens:
1st, W. Heustis & Son, Early Market, $4; 2d, W. Heustis & Son, Copenhagen, $3.
Cauliflower.— Four specimens:
1st, A. W. Preston, New Pearl, $4; 2d, Miss E. B. Thacher, Early Paris, $3.
Carrots.— Six specimens:
1st, W. Heustis & Son, Short Horn, $3.
Cucumbers.— Four:
1st, Oliver Ames, Telegraph, $3; 2d, J. J. Lyons, $2.
Lettuce.— Four heads:
1st, Oliver Ames, Big Boston, $3; 2d, James Donald, Farquhar's Express Cos., $2.

Peas.— Fifty pods:
1st, Oliver Ames, Breck's Record, $3; 2d, James Donald, Laxton's Superb, $2.
Potatoes.— Twelve specimens:
1st, Oliver Ames, Albino, $3.
Tomatoes.— Twelve specimens:
1st, Oliver Ames, Sterling Castle, $3.
Collection of Vegetables.— Twelve varieties:
1st, Miss E. B. Thacher, $15.
Six varieties:
1st, Oliver Ames, $10; 2d, W. Heustis & Son, $5.

Gladiolus and Phlox Exhibition.

August 11 and 12.

William J. Walker Fund.

Beans.— Two quarts shelled, not Lima:
1st, W. Heustis & Son, Horticultural, $3; 2d, D. L. Fiske, Horticultural, $2.
String, four quarts:
1st, James Donald, Plentiful, $3; 2d, D. L. Fiske, $2.
Cucumbers.— White Spine variety:
1st, J. J. Lyons, $3; 2d, W. Heustis & Son, $2.
Cabbage.— Four specimens:
1st, Miss E. B. Thacher, $3; 2d, James Donald, $2.
Onions.— Twelve specimens:
1st, Mrs. Henry Lyman, $4; 2d, Oliver Ames, $3.
Peppers.— Twelve specimens, any variety:
1st, D. L. Fiske, $3.
Squash.— Marrow, three specimens:
1st, W. Heustis & Son, $3.
Sweet Corn.— Twelve ears, any variety:
1st, D. L. Fiske, Peep o' Day, $3; 2d, D. L. Fiske, Jennings, $2.
Tomatoes.— Twelve specimens:
1st, Miss E. B. Thacher, Chalk's Jewell, $3; 2d, Oliver Ames, Jewell, $2.
Collection of Vegetables.— Fifteen varieties:
1st, James Donald, $10; 2d, Miss E. B. Thacher, $8.
Eight varieties:
1st, W. Heustis & Son, $5; 2d, D. L. Fiske, $4.

Dahlia and Fruit Exhibition.

September 8 and 9.

Collection of Vegetables.— Ten varieties:
1st, Mrs. Henry Lyman, $10; 2d, James Donald, $8.
Five varieties:
1st, D. L. Fiske, $5; 2d, D. L. Fiske, $4.

Honorable Mention.

September 8. Mrs. Henry Lyman, Prizewinner Bean.

REPORT OF THE COMMITTEE ON GARDENS FOR THE YEAR 1917.

Richard M. Saltonstall, Chairman.

The Committee on Gardens has made two visits during the year, one to the commercial greenhouses of William Sim at Cliftondale and the other to the private estate of B. H. Bristow Draper at Hopedale. They are reported upon as follows:

Greenhouses of William Sim, Cliftondale.

On March 31 the committee was invited to inspect the commercial plant of William Sim at Cliftondale to see his extensive collection of *Primula polyantha* hybrids, sweet peas, violets, and carnations. The center of interest in this visit was the houses of primroses and auriculas which Mr. Sim is endeavoring to popularize as florists' flowers. Auriculas especially show a wonderful combination of color and although considered hardy are best adapted to greenhouse cultivation in this climate. Mr. Sim reports an encouraging demand for them by the florists.

The quality of the sweet peas and violets in his numerous houses sustained the well deserved reputation of Mr. Sim as a master cultivator.

Estate of B. H. Bristow Draper at Hopedale.

On July 30 the committee had the pleasure of visiting the estate of B. H. Bristow Draper at Hopedale although it happened to be the hottest day of the summer with a temperature of 98° in the shade.

The committee was very favorably impressed with Mr. Draper's estate which adjoins that of the late Governor Draper. The lawn

was of notable interest covering about three acres and was in splendid condition and looked quite verdant after several weeks of drought although no attempt had been made to water it artificially.

A pergola of rambler roses was still in splendid bloom and a large collection of hardy varieties of roses was noted. A small and neatly arranged formal garden with a pool in the center was tastefully planted with the best annuals and herbaceous perennials. The shrubberies and shade trees all showed that they had received careful attention, and in fact, the whole estate reflected credit upon the horticultural interest of its owner and upon George Piddington, the gardener in charge of the grounds.

Certificates of Honorable Mention were awarded by the committee to Mr. Sim and Mr. Draper.

RICHARD M. SALTONSTALL
JOHN S. AMES
DAVID R. CRAIG
WILLIAM NICHOLSON
CHARLES SANDER
CHARLES H. TENNEY

Committee on Gardens.

REPORT OF THE COMMITTEE ON CHILDREN'S GARDENS.

By Henry Saxton Adams, Chairman.

The annual exhibition of the products of children's gardens, held at Horticultural Hall on Saturday and Sunday, September 1st and 2nd, 1917, was the largest ever held in our halls, filling as it did not only the large and small exhibition halls but also the lecture hall. One well remembers the time when our first exhibition only filled a portion of the small exhibition hall. We have watched the growth of the exhibits from year to year with a great deal of interest and have wondered whether it would be possible some time to fill all of the halls. This year it was accomplished, all available space being occupied.

It is well to again call attention to the fact that not only have our exhibits grown in size but also in the quality of the products exhibited, comparing favorably with the regular exhibitions of the Society. The number of exhibitors has also increased from year to year and we feel very sure that the result of our work will not only encourage many children to become successful gardeners but will also ultimately encourage them to become active members of the Society.

The appropriations for prizes were the same as the previous year, namely, $350.00, of which $200.00 was given by the State for the encouragement of agriculture among children and in addition $50.00 was given by interested friends making a total of $400.00 all of which was awarded to the various exhibitors.

It may be interesting to print here the news item which appeared in the Florists' Exchange on September 8, 1917.

Children's Garden Exhibition.

The exhibition at Horticultural Hall on Saturday and Sunday, Sept. 1 and 2 was the most interesting exhibition held in Boston for some time. The three exhibition halls were filled and the quality of the exhibits far

excelled anything of the kind that had ever been shown in this city by children. There were over 1000 entries, probably the largest number ever brought together in an exhibition of this kind. Competition was open to all school gardens and to all children in Massachusetts under 18. All kinds of vegetables were well grown and many of the classes were hard to judge, competition was so close. Onions were especially well done and some of them would compare favorably with the fine vegetables coming from Lenox. There were nearly 100 entries for Tomatoes and the winner of the first prize had six as nearly perfect specimens as the writer has ever seen at any exhibition. Potatoes were very well grown, considering the earliness of the season. The flower exhibits were also fine, including Asters, Dahlias and Gladioli, all nicely staged. The exhibits of wild flowers were the largest and most comprehensive the writer has seen in this city for many years. One boy had over 100 kinds, correctly named and attractively arranged. If children can raise such fine vegetables there is little fear of a scarcity of food in this country.

It is particularly pleasing to your Committee to acknowledge at this time the cooperation of the Board of Trustees and various Committees. There never was a season in which the encouragement of gardening among the children was more important and we hope for an equally good exhibit this year, although we have been obliged to somewhat reduce our schedule.

A list of the principal awards is appended to this report.

For the best collection of vegetables from a school garden:

First.— Greenwood School, Hyde Park	$6 00
Second.— McKinley School, Brockton	5 00
Third.— Huntington School, Brockton	4 00

For the best collection of vegetables from a school garden established since January 1, 1914:

First.— Norfolk House Center, Roxbury	$5 00
Second.— Industrial School, Dorchester	4 00
Third.— Agassiz Prevocational School, Jamaica Plain	3 00
Fourth.— Trescott School, Mattapan	2 00
Fifth.— Dorchester Neighborhood House	1 00

For the best collection of vegetables from a school garden within five miles of the State House:

First.— Young People's Garden, Boston	5 00
Second.— Sterling St. School, Boston	4 00
Third.— Edward Everett School, Dorchester	3 00
Fourth.— Martin School, Boston	2 00

For the best collection of flowers from a school garden:

First.— Young People's Garden, Boston	6 00
Second.— Winthrop School, Brockton	5 00
Third.— Industrial School, Dorchester	4 00
Fourth.— Cary School, Brockton	3 00

For the best collection of flowers from a school garden within five miles of the State House:

First.— Norfolk House Center, Roxbury	5 00

For the best collection of vegetables from a child's home garden:

First.— Emil Erickson, Brockton	5 00
Second.— Raphael Durando, Jamaica Plain	4 00
Third.— Mary Scanlon, Roxbury	3 00
Fourth.— Wilfred R. Tuttle, Arlington	2 00
Fifth.— Katharine Kilroy, Jamaica Plain	1 00

For the best collection of vegetables from a child's home garden within five miles of the State House:

First.— Richard Peterson, Jamaica Plain	3 00
Second.— Sumner Hersey, Dorchester	2 00
Third.— William J. Brown, Jamaica Plain	1 00
Fourth.— Cathleen Galvin, Dorchester	1 00
Fifth.— Edward Spurr, Dorchester	1 00

For the best collection of flowers from a child's home garden:

First.— Gertrude Entner, Boston	5 00
Second.— Wilfred R. Tuttle, Arlington	4 00
Third.— Francis Kernan, Dorchester	3 00
Fourth.— Robert Johnson, Dorchester	2 00
Fifth.— Barbara Shaw, Dorchester	1 00

For the best collection of wild flowers, berries, leaves, and grasses, correctly named as far as possible, dried specimens excluded:

First.— Lester D. Watson, Dorchester	5 00
Second.— Kenneth R. Craig, Jamaica Plain	4 00
Third.— Albert Davidson, Melrose	3 00
Fourth.— Marion L. Carnegie, Dorchester	2 00

For the best collection of vegetables from a child's garden put up in glass jars by the exhibitor:

First.— Gertrude Schulz, Roslindale 3 00
Second.— Margaret Galvin, Dorchester 2 00
Third.— Milton Canning Club 1 00

HENRY SAXTON ADAMS
DR. HARRIS KENNEDY
MRS. W. RODMAN PEABODY
MISS MARGARET A. RAND
JAMES WHEELER
Committee on Children's Gardens.

REPORT OF THE DELEGATE TO THE STATE BOARD OF AGRICULTURE FOR THE YEAR 1917.

By Edward B. Wilder, Delegate.

Perhaps the work of the Board that is of most interest to the Horticultural Society is comprised in the Nursery Inspection, the Apiary Inspection, and the Apple Grading Inspection.

Nursery imports have necessarily fallen off this year owing to the war in Europe. The State now has 146 licensed nurseries. After fifteen years of service to the Board, Dr. H. T. Fernald has resigned as State Nursery Inspector, and Mr. R. Harold Allen has been appointed in his place.

An important feature of the nursery inspection work for the past year has been the extermination of the White Pine Blister Rust. This has been carried on in connection with the United States Department of Agriculture, both the State and the Nation having contributed $50,000 to the work in Massachusetts. The scouting for the disease done in 1916 enabled the Nursery Inspector this year to pick out certain badly infected areas and eradicate from them completely the currants and gooseberries. This was done in the hope that these areas might be made safe for the growth of white pine. The towns of Warwick, Petersham, Dana, Hardwick, Barre, Marshfield, and Ipswich were made eradication areas and from these towns the Ribes, wild and cultivated, diseased and undiseased, have been entirely eliminated. In connection with this work an accurate census of the currant and gooseberry bushes in this State has been taken in order to estimate the comparative value of these fruits compared to the white pines.

The apiary inspection service has made a special drive to impress both on beekeepers and the public the value and importance of honey production, especially in view of the shortage of sugar. Special beekeeping agents have been appointed in seventy towns of the State who serve without pay and keep the State Inspector informed of beekeeping conditions in their localities. A splendid

exhibit of honey and apiary appliances was set up at the Eastern States Exposition and attracted much attention.

The year 1917 was the second year in which the Apple Grading Law was compulsory. Apple grading laws are gradually becoming universal and are now in force in 13 states in the northeastern part of the Union. The quality of the crop in Massachusetts was fifty percent better than in 1916 and as a result a larger proportion of the crop was packed as A Grade. Three cases were entered in court, and a conviction secured in each case.

The Public Winter Meeting of the Board was held in Springfield in December, 1916, and the Summer Field Meeting was omitted on account of the war.

Owing to the passage of the Anti-Aid Amendment by the Constitutional Convention and its acceptance by the people, agricultural societies cannot receive bounty after October 1, 1918. This means that the Horticultural Society will be deprived of this source of income, and with the other agricultural societies will lose its representation on the Board of Agriculture. This will probably mean a complete reorganization of the agricultural department either by the incoming legislature or the Constitutional Convention at its 1918 session.

REPORT OF THE SECRETARY AND LIBRARIAN FOR THE YEAR 1917.

Several events stand out prominently in the activities of the Society during the past year which are worthy of record in this report.

The principal one was the June Outdoor Flower Show, held June 2 to 20, on the grounds of the Wentworth Institute on Huntington Avenue, Boston, containing an area of three acres.

On account of the magnitude of the undertaking and the notable horticultural display which was produced a record of it should be preserved in the annals of the Society. Many of its features will long remain in the memory of the visitors and as time passes the impressions left by this exhibit seem to grow stronger. It was without doubt the most extensive exhibition ever held by the Society.

Seven large tents were provided and filled with the finest productions of the gardener's art; including great collections of Orchids, Roses, Azaleas and Wistarias, Rhododendrons, and miscellaneous displays of tropical foliage plants, cut flowers, and bulbous plants.

On the outside grounds were numerous plantings of hardy, evergreen trees and shrubs, an immense circular bed of pansies, and many other collections of seasonable flowering plants.

One of the most conspicuous and attractive features was the rock garden with a goodly-sized pond in the center around which were massed naturally arranged rock slopes filled with a great variety of rock-loving flowering plants.

The entire receipts of the opening day were given to the Red Cross resulting in a liberal contribution to the funds of this noble charity.

Horticulturally the exhibition was a great success but owing to unfortunate weather conditions the financial results were disappointing and a considerable loss resulted. The season was unusually backward, with rainy weather prevailing most of the time,

and the Rhododendrons did not come into full bloom until near the end of the show.

In addition to the open-air show ten other exhibitions were held in the Society's building all of which were satisfactory and the public interest in them showed no abatement.

The Spring Flower Show in March was a notable success both horticulturally and financially.

The July Sweet Pea Exhibition was held in conjunction with the annual meeting of the American Sweet Pea Society and resulted in a display of this popular flower of more than the usual interest.

The Special Fruit Show of October 31 to November 4 was held in conjunction with the Thirty-fifth Biennial Session of the American Pomological Society and the Fifth Exhibition of the New England Fruit Show. All the halls were filled on this occasion with an immense display of fruit representing the products of a wide range of territory from Canada to Florida.

The course of lectures held during January, February, and March proved satisfactory, an average attendance of 150 people being recorded.

Through the influence of several members of the Board of Trustees 57 new life members and 26 new annual members were added during the year, making the total membership of the Society December 31, 1917, 979.

On the whole the year has been a noteworthy one in advancing the objects for which the Society was established, that of increasing the interest in all branches of horticulture.

The publications of the Society during the year and dates of issue are as follow:

January 12. Schedule of Prizes and Exhibitions, 46 pp.

May 1. Transactions, 1916, Part II, pp. 146–267, and Plates 1 and 2.

July 13. Transactions, 1917, Part I, pp. 1–107.

September 28. Preliminary Schedule for the exhibitions of January, March, and May, 1918, 12 pp. This schedule was later withdrawn as far as the money prizes were concerned.

The Library.

The printing of the new catalogue of the library has advanced as far as the completion of the first part containing the alphabetical list of authors, periodicals, and society publications. Work on the second part, that of the classified arrangement of the books, is in progress and every effort will be made to complete the entire volume during the ensuing year.

Through the generous gift of Mr. E. B. Dane of the Library Committee funds were provided to purchase several valuable books on landscape art. Mr. N. T. Kidder and Prof. C. S. Sargent, also of the Library Committee, have continued their interest in the library by contributing a number of publications which are very acceptable additions. The Massachusetts Society for Promoting Agriculture presented fifty volumes, mostly pertaining to ancient agriculture, all of which are important acquisitions.

The additions to the collection of horticultural trade catalogues during the year have largely increased, 925 having been received by gift or purchase, making the total number in this class 10665.

William P. Rich,
Secretary and Librarian.

REPORT OF THE TREASURER FOR THE YEAR 1917.

MASSACHUSETTS HORTICULTURAL SOCIETY *in account current with* WALTER HUNNEWELL, *Treasurer, December 31, 1917.*

DR.

Paid for Library from Appropriation		$303 67		
" " " " J. D. W. French Fund		119 46		
" " " " J. S. Farlow Fund		57 04		
" " Heating		2,138 48		
" " Lighting		788 06		
" " Labor		2,037 16		
" " Stationery and Printing		1,259 80		
" " Postage		235 00		
" " Insurance		3,959 48		
" " Incidentals		1,261 13		
" " Repairs		224 46		
" " Committee on Lectures and Publications		325 00		
" " Salaries of Officers		4,545 92		
" " " Committee on Plants and Flowers		229 00		
" " " " " Fruits		151 00		
" " " " " Vegetables		129 00		
" " " " " Prizes & Exhibitions		319 37		
" " Medals		414 85		
" " Prizes for Plants and Flowers		3,947 00		
" " Prizes for Fruits		1,428 00		
" " Prizes for Vegetables		319 00		
" " Prizes for Children's Gardens		387 50		
" " J. C. Chaffin Fund		62 00		
" " John Lewis Russell Fund		25 00		
" " G. R. White Medal of Honor Fund		261 73		
" " Library Catalogue		1,000 00		
" " June Outdoor Flower Show		275 32	$26,203 43	
" " $12,000 U. S. Liberty Bonds			12,000 00	
Balance Dec. 31, 1917, Treasurer and Bursar			2,404 90	
			$40,608 33	

Cr.

Balance December 31, 1916			$17,032 10
Received Rents		3,996 60	
" Exhibitions	7,383 25		
" less expenses	5,882 90	1,500 35	
" Membership Fees (873.00. Income a/c, 1425.00 Perm. Fund)		2,298 00	
" State Bounty		1,000 00	
" Sundry Donations		584 65	
" Mount Auburn Cemetery (634.96 Income a/c 634.96 Perm. Fund).		1,269 92	$10,649 52
" Interest on securities from the following funds:			
S. Appleton		40 00	
J. A. Lowell		40 00	
T. Lyman		440 00	
J. Bradlee		40 00	
B. V. French, No. 1		20 00	
H. H. Hunnewell		160 00	
W. J. Walker		94 16	
L. Whitcomb		20 00	
B. B. Davis		20 00	
M. P. Wilder		40 00	
J. L. Russell		40 00	
F. B. Hayes		400 00	
H. A. Gane		40 00	
J. S. Farlow		100 00	
J. D. W. French		200 00	
B. H. Pierce		32 00	
J. C. Chaffin		40 00	
B. V. French, No. 2		120 00	
G. R. White		300 00	
J. S. Farlow, Newton		116 00	
J. A. French		200 00	2,502 16
" Interest and dividends on securities other than those for the above funds			10,424 55
			$40,608 33

Assets.

Real Estate	$518,564 63
Furniture and Exhibition Ware	10,796 96
Library	45,110 47
Plates and History	235 50
$2000 Kansas City, Clinton, and Springfield Bonds	1,980 00
10,000 Lake Shore and Mich. So. Bonds	10,415 25
21,000 City of Newton Bonds	24,228 75
50,000 Atch. Topeka and S. F. Bonds	44,693 25
50,000 Chicago Burl. and Quincy Bonds	50,012 50
11,300 Pere Marquette 5s	9,987 50
25,000 K. C. F. S. and Memphis Bonds	27,523 75
50,000 C. B. and Q. Illinois Bonds	51,625 00
8,000 Boston and Maine Bonds	8,710 00
4,000 Am. Tel. & Tel. 4 % Bonds, 1936	4,110 00
4,000 United Fruit 5 % Notes, 1918	3,840 00
4,000 Interboro 5 % Bonds, 1966	3,920 00
12,000 Pacific Telephone Bonds	11,670 00
260 shares General Electric Stock	12,909 90
Hayes and Loring, Trustees	2,308 66
Cash in hands of Treasurer and Bursar	2,404 90
$12,000 U. S. Liberty Bonds	12,000 00
	$857,047 02

Liabilities.

Funds invested in Bonds and Stocks:		
S. Appleton	Fund	$1,000 00
J. A. Lowell	"	1,000 00
T. Lyman	"	11,000 00
J. Bradlee	"	1,000 00
B. V. French, No. 1	"	500 00
H. H. Hunnewell	"	4,000 00
W. J. Walker	"	2,354 43
L. Whitcomb	"	500 00
B. B. Davis	"	500 00
M. P. Wilder	"	1,000 00
J. L. Russell	"	1,035 00
F. B. Hayes	"	10,000 00
H. A. Gane	"	1,224 00
J. S. Farlow	"	2,583 76
J. D. W. French	"	5,323 51

B. H. Pierce Fund	800 00		
J. C. Chaffin "	1,228 89		
B. V. French, No. 2 "	3,000 00		
J. A. French "	5,000 00		
G. R. White "	7,711 72		
J. S. Farlow, Newton "	2,900 42		
Library Catalogue "	670 00		
Unrestricted Funds	5,000 00	$69,331	73
Capital and Surplus		787,715	29
		$857,047	02

WALTER HUNNEWELL,
Treasurer.

MEMBERSHIP OF MASSACHUSETTS HORTICULTURAL SOCIETY.

DECEMBER 31, 1917.

Life Members, December 31, 1916		760	
Added in 1917		57	
Changed from Annual		1	
		818	
Deceased		21	797
Annual Members, December 31, 1916		165	
Added in 1917		26	
		191	
Deceased	2		
Changed to Life	1		
Resigned	3		
Dropped for non-payment of dues	3	9	182
Membership, December 31, 1917			979

INCOME FROM MEMBERSHIP.

57 New Life Members at $30	$1,710 00
26 New Annual Members at $10	260 00
1 Changed to Life	20 00
Assessments for 1917	308 00
	$2,298 00

WALTER HUNNEWELL,
Treasurer.

STATEMENT OF INCOME AND EXPENSE FOR THE YEAR 1917.

Income.

Income from Interest on Investments		$12,605 00	
" " Bank Interest		321 71	$12,926 71
" " Rents			3,996 60
" " Exhibitions			1,500 35
" " State Bounty			1,000 00
" " Membership Fees			873 00
" " Donations			684 65
" " Sale of Lots in Mt. Auburn Cemetery			634 96
Total Income			$21,616 27
Less Interest added to Funds; viz; Total Credits to Funds	$2,502 16		
Less charges to Funds	2,307 39		194 77
			$21,421 50

Expense.

Operating Expense		$16,753 16	
Viz: Salaries	$4,545 92		
Insurance	3,959 48		
Heating	2,138 48		
Labor	2,037 16		
Incidentals	1,261 13		
Stationery & Printing	1,259 80		
Lighting	788 06		
Library Appropriation	303 67		
Postage	235 00		
Repairs	224 46		
Prizes		6,081 50	
Viz: Plants & Flowers	$3,947 00		
Fruit	1,428 00		
Children's Gardens	387 50		
Vegetables	319 00		
Expenditures by Committees		1,568 22	
Viz: On Medals	$414 85		
Lectures and Publications	325 00		
Prizes	319 37		
Plants	229 00		
Fruit	151 00		
Vegetables	129 00		

Outdoor Flower Show		275 32	
Expense Paid from Funds		525 23	
J. D. W. French Fund	$119 46		
J. S. Farlow Fund	57 04		
White Medal Fund	261 73		
J. Lewis Russell Fund	25 00		
J. C. Claffin Fund	62 00		
		$25,203 43	$25,203 43
Excess of Expense			$3,781 93

AUDITOR'S CERTIFICATE.

Boston, April 2, 1918.

To the Finance Committee of the
Massachusetts Horticultural Society, Boston.

Gentlemen:

We have audited the accounts of the Treasurer and of the Bursar for the year ended December 31, 1917, and find all payments supported by suitable vouchers and all receipts properly recorded and deposited.

All securities reported to be on hand on January 1, 1917, or which have been acquired since, were seen either to be on hand on the day of the examination or were fully accounted for by the records.

The cash report of the Treasurer was checked and found to be in agreement with the books, and the decrease in accumulated income due to expense payments in excess of income receipts is correctly set forth in the income-and-expense statement herewith.

Very respectfully,

Harvey S. Chase & Co.

THE ANNUAL MEETING, NOVEMBER 17, 1917.

ANNUAL MEETING FOR THE YEAR 1917.

The Annual Meeting of the Massachusetts Horticultural Society for the year 1917 was held at Horticultural Hall, Boston, on Saturday, November 17, at twelve o'clock, noon, with Vice President, Nathaniel T. Kidder, in the chair.

The Secretary announced that the meeting was called in accordance with the requirements of the By-laws of the Society for the purpose of electing a President, a Vice President, four Trustees, a Nominating Committee, and a Delegate to the State Board of Agriculture for the ensuing year, and for the transaction of such other business as might be legally presented.

The President appointed E. B. Wilder, J. A. Crosby, and W. P. Rich a committee to receive, assort, and count the ballots, and report the number, and declared the polls open, to remain open until three o'clock.

The record of the preceding meeting of the Society was read by the Secretary and duly approved.

Vice President Kidder stated that in compliance with the provisions of Section IX. of the By-laws the Board of Trustees had made an appropriation of $4500.00 for prizes and gratuities for the year 1918.

A recess until three o'clock was declared when the ballot committee made report as follows:

Whole number of ballots cast 20, all of which were for the regular nominees.

Vice President Kidder announced that the following list of officers had been duly elected for the year 1918:

President	Richard M. Saltonstall
Vice President	Charles S. Sargent
(for two years)	
Trustees	Thomas Allen
(for three years)	Walter Hunnewell
	Charles W. Moseley
	Thomas Roland

Delegate to the State Board of Agriculture (for three years)	Samuel J. Goddard
Nominating Committee	John S. Ames
	Robert Cameron
	Thomas Roland
	Edwin S. Webster
	Ernest H. Wilson

The meeting was then dissolved.

William P. Rich,
Secretary.

NECROLOGY, 1917.

NECROLOGY, 1917.

Admitted		Died
1868	Robert Marion Pratt	January 9
1869	Louis B. Harding	January 12
1871	James Macmaster Codman	January 24
1892	Theodore H. Tyndale	January 31
1865	John G. Barker	February 7
1900	Mrs. Oliver Ames, Senior	March 11
1891	Miss Sarah Haskell Crocker	March 31
1870	Franklin Howard Gilson	April 19
1915	Mrs. Harry F. Fay	May 23
1891	Edward E. Norton	June 5
1917	Carlos M. de Heredia	June 15
1905	Philippe L. de Vilmorin	June 30
1900	Edward E. Cole	October 8
1899	George Abbott James	October 13
1914	Mrs. Robert Dawson Evans	October 16
1900	Henry Gregory Jordan	October 16
1852	George B. Durfee	October 29
1863	Abner A. Kingman	November 10
1901	David Welch	November 27
1899	Zenas Crane	December 17

OFFICERS, COMMITTEES, AND MEMBERS, 1917.

Massachusetts Horticultural Society

OFFICERS AND STANDING COMMITTEES FOR 1917

President

RICHARD M. SALTONSTALL, of Newton

Vice-Presidents

WALTER HUNNEWELL, of Boston
NATHANIEL T. KIDDER, of Milton

Treasurer

WALTER HUNNEWELL, of Boston

Secretary

WILLIAM P. RICH, of Chelsea*

Trustees

THOMAS ALLEN, of Boston
F. LOTHROP AMES, of North Easton
GEORGE E. BARNARD, of Ipswich
ERNEST B. DANE, of Brookline
WILLIAM C. ENDICOTT, of Boston
ARTHUR F. ESTABROOK, of Boston
JOHN K. M. L. FARQUHAR, of Boston
ANDREW W. PRESTON, of Boston
THOMAS ROLAND, of Nahant
CHARLES S. SARGENT, of Brookline
EDWIN S. WEBSTER, of Boston
STEPHEN M. WELD, of Wareham

Delegate to the State Board of Agriculture

EDWARD B. WILDER, Dorchester

Nominating Committee

WILLIAM DOWNS, Chestnut Hill JOHN K. M. L. FARQUHAR, Boston
NATHANIEL T. KIDDER, Milton MARCELLUS A. PATTEN, Tewksbury
WILLIAM SIM, Cliftondale

* Communications to the Secretary, on the business of the Society, should be addressed to him at Horticultural Hall, Boston.

COMMITTEES FOR 1917

Finance Committee

WALTER HUNNEWELL, *Chairman*
ARTHUR F. ESTABROOK STEPHEN M. WELD

Membership Committee

THOMAS ALLEN GEORGE E. BARNARD
RICHARD M. SALTONSTALL

Committee on Prizes and Exhibitions

JAMES WHEELER, *Chairman*
JOHN K. M. L. FARQUHAR DUNCAN FINLAYSON
T. D. HATFIELD THOMAS ROLAND

Committee on Plants and Flowers

WILLIAM ANDERSON, *Chairman*
ARTHUR H. FEWKES ARTHUR E. GRIFFIN
S. J. GODDARD DONALD McKENZIE

Committee on Fruits

EDWARD B. WILDER, *Chairman*
WILLIAM N. CRAIG ISAAC H. LOCKE
JAMES METHVEN

Committee on Vegetables

JOHN L. SMITH, *Chairman*
EDWARD PARKER WILLIAM C. RUST

Committee on Gardens

RICHARD M. SALTONSTALL, *Chairman*
JOHN S. AMES DAVID R. CRAIG
WILLIAM NICHOLSON CHARLES SANDER
CHARLES H. TENNEY

Committee on Library

CHARLES S. SARGENT, *Chairman*
ERNEST B. DANE NATHANIEL T. KIDDER

Committee on Lectures and Publications

FRED A. WILSON, *Chairman*
LEONARD BARRON NATHANIEL T. KIDDER

Committee on Children's Gardens

HENRY S. ADAMS, *Chairman*
DR. HARRIS KENNEDY MRS. W. RODMAN PEABODY
MISS MARGARET A. RAND JAMES WHEELER

MEMBERS OF THE MASSACHUSETTS HORTICULTURAL SOCIETY, 1917.

Revised to December 31, 1917.

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 lists are inaccurate in any particular, will confer a favor by promptly communicating to the Secretary the needed corrections.

1900 Dr. Henry S. Pritchett, Washington, D. C.
1900 Albert Viger, President of the National Society of Horticulture of France, Paris.
1897 Hon. James Wilson, Ex-Secretary of Agriculture.

CORRESPONDING MEMBERS.

1901 George Francis Atkinson, Professor of Botany in Cornell University, Ithaca, N. Y.
1889 Dr. L. H. Bailey, Ithaca, N. Y.
1898 John Gilbert Baker, F. R. S., F. L. S., Kew, England.
1875 Professor William J. Beal, Amherst, Mass.
1911 W. J. Bean, Royal Botanic Gardens, Kew, England.
1911 John Dunbar, Park Department, Rochester, N. Y.
1887 Sir W. T. Thiselton Dyer, K. C. M. G., F. R. S., "Witcombe," Gloucester, England.
1875 Parker Earle, President of the American Horticultural Society, Roswell, N. M.
1887 H. J. Elwes, F. R. S., Colesborne, Cheltenham, England.
1889 William G. Farlow, M. D., Professor of Cryptogamic Botany, Harvard University, Cambridge, Mass.
1893 B. E. Fernow, University of Toronto, Toronto, Ontario.

1900 Dr. Beverly T. Galloway, Department of Agriculture, Washington, D. C.
1877 George Lincoln Goodale, M. D., Cambridge, Mass.
1895 Professor Byron D. Halsted, Botanist at the New Jersey Agricultural Experiment Station, New Brunswick, N. J.
1914 C. S. Harrison, York, Nebraska.
1911 Professor U. P. Hedrick, New York Agricultural Experiment Station, Geneva, N. Y.
1907 Augustine Henry, F. L. S., M. R. I. A., Professor of Forestry, Royal College of Science, Dublin, Ireland.
1897 J. W. Hoffmann, Colored State University, Orangeburg, S. C.
1906 Senor Don Salvador Izquierdo, Santiago, Chile.
1911 Émile Lemoine, Nancy, France.
1875 T. C. Maxwell, Geneva, N. Y.
1911 J. Ewing Mears, M. D., Philadelphia, Pa.
1911 Wilhelm Miller, Superintendent of Horticulture, University of Illinois, Urbana, Illinois.
1898 Sir Frederick W. Moore, Curator of the Royal Botanic Gardens, Glasnevin, Dublin, Ireland.
1887 Sir Daniel Morris, C. M. G., D.Sc., M. A., F. L. S.
1898 Peter Nφvik, Secretary of the Norwegian Horticultural Society, Christiania, Norway.
1912 C. Harman Payne, London, England.
1906 Sir David Prain, C. I. E., C. M. G., F. R. S., Director of the Royal Botanic Gardens, Kew, England
1894 Cavalière Enrico Ragusa, Palermo, Sicily.
1906 Dr. Henry L. Ridley, C. M. G., F. R. S., Kew, England.
1898 Benjamin Lincoln Robinson, Ph.D., Curator of the Gray Herbarium of Harvard University, Cambridge, Mass.
1875 William Robinson, London, England.
1899 William Salway, Superintendent of Spring Grove Cemetery Cincinnati, O.
1875 Robert W. Starr, Wolfville, N. S.
1893 Professor William Trelease, University of Illinois, Urbana, Illinois.
1882 H. J. Veitch, Chelsea, England.
1905 Maurice L. de Vilmorin, Paris, France.
1912 Professor Hugo de Vries, University of Amsterdam, Amsterdam, Holland.
1894 William Watson, Curator of Royal Botanic Gardens, Kew, England.
1906 Miss E. Willmott, Essex, England.
1911 E. H. Wilson, Jamaica Plain, Mass.
1901 Professor L. Wittmack, Secretary of the Royal Prussian Horticultural Society, Berlin, Prussia.

LIFE MEMBERS.

1899 Adams, Mrs Charles Francis, South Lincoln.
1907 Adams, George E., Kingston, R. I.
1897 Adams, Henry Saxton, Jamaica Plain.
1899 Agassiz, Mrs. George R., Yarmouth Port.
1894 Allen, Hon. Charles H., Lowell.
1916 Allen, Edward Ellis, Watertown.
1905 Allen, Mrs. Sarah R., Wilmington.
1898 Allen, Thomas, Boston.
1899 Ames, F. Lothrop, North Easton.
1914 Ames, Mrs. F. L., North Easton.
1899 Ames, John S., North Easton.
1894 Ames, Oakes, North Easton.
1899 Ames, Oliver, North Easton.
1867 Amory, Frederic, Boston.
1899 Anderson, Larz, Brookline.
1911 Anderson, William, South Lancaster.
1864 Andrews, Charles L., Milton.
1871 Appleton, Hon. Francis H., Boston.
1914 Appleton, Francis R., New York, N. Y.
1913 Appleton, Henry Saltonstall, Boston.
1914 Apthorp, Mrs. Harrison O., Milton.
1900 Arnold, Mrs. George Francis, Brookline.
1894 Ash, John, Pomfret Centre, Conn.
1890 Atkins, Edwin F., Belmont.
1914 Ayer, Mrs. Frederick, Boston.
1899 Ayer, James B., Boston.

1912 Bache, James S., Sharon, Conn.
1905 Backer, Clarence A., Melrose.
1914 Bacon, Miss E. S., Jamaica Plain.
1905 Badger, Walter I., Cambridge.
1894 Bailey, Jason S., West Roxbury.
1902 Bailey, Robert M., Dedham.
1902 Baker, Clifton P., Dedham.
1901 Baker, James E., South Lincoln.
1904 Balch, Joseph, Dedham.
1909 Baldwin, Frank F., Ashland.
1888 Barber, J. Wesley, Newton.
1904 Barker, George, Swampscott.
1905 Barnard, George E., Ipswich.
1866 Barnes, Walter S., Brookline.
1904 Barney, Arthur F., Dorchester.
1867 Barney, Levi C., Boston.
1917 Barrett, Mrs. William Emerson, West Newton.
1897 Barry, John Marshall, Boston.
1901 Bartlett, Miss Mary F., Boston.
1914 Bartol, Dr. John W., Boston.
1915 Bartsch, Hermann H., Waverley.
1901 Bates, Miss Mary D., Ipswich.
1915 Bauernfeind, John, Medford.
1899 Baylies, Walter C., Taunton.
1914 Beal, Mrs. Boylston, Boston.
1905 Beal, Thomas P., Boston.
1891 Becker, Frederick C., Cambridge.
1876 Beckford, Daniel R., Jr., Dedham.
1894 Beebe, E. Pierson, Boston.

1890 Beebe, Franklin H., Boston.
1905 Bemis, Frank B., Beverly.
1914 Bemis, Mrs. Frank B., Beverly.
1899 Bigelow, Albert S., Cohasset.
1914 Bigelow, Charles, Brookline.
1899 Bigelow, Joseph S., Cohasset.
1899 Bigelow, Dr. William Sturgis, Boston.
1899 Black, George N., Manchester.
1885 Blake, Mrs. Arthur W., Brookline.
1914 Blake, Benjamin S., Auburndale.
1897 Blake, Edward D., Boston.
1908 Blood, Eldredge H., Swampscott.
1905 Boardman, Miss Eliza D., Boston.
1899 Boardman, T. Dennie, Manchester.
1914 Boit, Miss Elizabeth E., Wakefield.
1894 Bosler, Frank C.,Carlisle, Penn.
1914 Bowditch, Alfred, Jamaica Plain.
1887 Bowditch, Charles P., Jamaica Plain.
1897 Bowditch, Ernest W., Milton.
1883 Bowditch, James H., Brookline.
1894 Bowditch, Nathaniel I., Framingham.
1877 Bowditch,William E., Roxbury.
1913 Brackett, C. Henry B., Boston.
1912 Bradley, Charles H., Boston.
1914 Brandegee, Mrs. Edward D., Brookline.
1900 Breck, Joseph Francis, Waban.
1914 Breck, Luther Adams, Newton.
1871 Bresee, Albert, Hubbardton, Vt.
1914 Brewer, Edward M., Milton.
1914 Brewer, Joseph, Milton.
1905 Brewster, William, Cambridge.
1910 Briggs, Mrs. George R., Plymouth.
1897 Briggs, William S., Lincoln.
1873 Brigham, William T., Honolulu, Hawaii.
1909 Brooke, Edmund G., Jr., Providence, R. I.
1914 Brooks, Miss Fanny, Readville.
1914 Brooks, Henry G., Milton.
1899 Brooks, Peter C., Boston.
1899 Brooks, Shepherd, Boston.
1912 Brooks, Walter D., Milton.
1909 Brown, Mrs. John Carter, Providence, R. I.
1907 Brush, Charles N., Brookline.
1915 Buckminster, W. B., Malden.
1906 Buitta, Vincent, Newton Upper Falls.
1914 Bullard, Alfred M., Milton.
1897 Burlen, William H., East Holliston.
1895 Burnett, Harry, Southborough.
1911 Burnett, John T., Southborough.
1914 Burnett, Robert M., Southborough.
1914 Burnham, Miss Helen C., Boston.
1909 Burr, I. Tucker, Milton.
1906 Burrage, Albert C., Boston.
1868 Butler, Aaron, Wakefield.
1907 Butterworth, George William, South Framingham.
1906 Butterworth, J. Thomas, South Framingham.
1905 Buttrick, Stedman, Concord.

1902 Cabot, George E., Boston.
1914 Cabot, Henry B., Brookline.
1870 Calder, Augustus P., Brookline.
1896 Cameron, Robert, Cambridge.
1913 Campbell, Chester I., Wollaston.
1891 Campbell, Francis, Cambridge.
1905 Carr, Samuel, Boston.
1893 Carter, Charles N., Needham.
1899 Casas, W. B. de las, Malden.
1911 Case, Miss Marian Roby, Weston.

1873 Chamberlain, Chauncy W., Waban.
1909 Chamberlain, Montague, Groton.
1903 Chapman, John L., Prides Crossing.
1878 Chase, Joseph S., Malden.
1909 Chase, Philip Putnam, Milton.
1895 Cheney, Mrs. Elizabeth S., Wellesley.
1894 Christie, William, Everett.
1876 Clapp, Edward B., Dorchester.
1871 Clapp, William C., Dorchester.
1896 Clark, B. Preston, Cohasset.
1917 Clark, Edward A., Jamaica Plain.
1896 Clark, Miss Eleanor J., Pomfret Centre, Conn.
1907 Clark, Herbert A., Belmont.
1890 Clark, J. Warren, Millis.
1910 Clark, Winslow, Milton.
1899 Clarke, Eliot C., Boston.
1914 Clifford, Charles P., Milton.
1895 Clough, Micajah Pratt, Lynn.
1894 Cobb, John C., Milton.
1914 Cochrane, Alexander, Boston.
1906 Codman, Miss Catherine A., Westwood.
1914 Codman, James M., Jr., Brookline.
1901 Coe, Miss Mary Alma, Boston.
1903 Cogswell, Edward R., Jr., Newton Highlands.
1882 Collins, Frank S., North Eastham.
1914 Collins, William J., Brookline.
1917 Comley, Henry R., Lexington.
1902 Comley, Norris F., Lexington.
1917 Converse, E. W., Newton.
1899 Converse, Col. H. E., Marion.
1913 Cook, Thomas N., Watertown.
1917 Cooley, Arthur N., Pittsfield.
1914 Coolidge, Charles A., Boston.
1902 Coolidge, Harold J., Boston.
1899 Coolidge, J. Randolph, Chestnut Hill.
1899 Coolidge, Mrs. J. Randolph, Chestnut Hill.
1914 Cotting, Charles E., Boston.
1914 Cotting, Mrs. Charles E., Boston.
1892 Cottle, Henry C., Boston.
1917 Cotton, Miss Elizabeth A., Brookline.
1914 Councilman, Dr. W. T., Boston.
1917 Cowey, S. R., Walpole, N. H.
1913 Cox, Simon F., Mattapan.
1892 Cox, Thomas A., Dorchester.
1914 Crafts, Miss Elizabeth S., Boston.
1910 Craig, David R., Boston.
1901 Craig, William Nicol, Brookline.
1917 Crane, Charles R., New York, N. Y.
1917 Crane, Mrs. R. T., Jr., Chicago, Ill.
1891 Crawford, Dr. Sarah M., Roxbury.
1917 Crocker, Mrs. George U., Boston.
1914 Crompton, Miss Isabel M., Worcester.
1887 Crosby, George E., West Medford.
1914 Crosby, Mrs. S. V. R., Boston.
1901 Cross, Alfred Richard, North Cohasset.
1909 Cumner, Mrs. Nellie B., Brookline.
1856 Curtis, Charles F., Jamaica Plain.
1899 Curtis, Charles P., Boston.
1906 Cutler, Mrs. Charles F., Boston.
1903 Cutler, Judge Samuel R., Revere.

1897 Damon, Frederick W., Arlington.
1908 Dane, Ernest B., Brookline.
1908 Dane, Mrs. Ernest B., Brookline.
1899 Daniels, Dr. Edwin A., Boston.

1909 Danielson, Mrs. J. DeForest, Boston.
1892 Davenport, Albert M., Watertown.
1902 Davis, Arthur E., Dover.
1902 Davis, Mrs. Arthur E., Dover.
1913 Davis, Bancroft Chandler, Weston.
1916 Davis, Miss Helen I., Wellesley.
1914 Davis, Livingston, Milton.
1909 Dawson, Henry Sargent, Jamaica Plain.
1905 Day, Henry B., West Newton.
1917 Day, Mrs. Mary E., Newton.
1873 Denny, Clarence H., Boston.
1917 Dexter, George T., Boston.
1904 Dexter, Gordon, Beverly Farms.
1904 Dexter, Philip, Beverly.
1866 Dike, Charles C., Stoneham.
1896 Donald, William, Cold Spring Harbor, N. Y.
1900 Donaldson, James, Roxbury.
1907 Doten, Scott T., Lincoln.
1917 Doty, George H., Boston.
1914 Douglass, Alfred, Brookline.
1917 Downs, Jere Arthur, Winchester.
1910 Downs, William, Chestnut Hill.
1917 Dowse, Charles F., Boston.
1893 Dowse, William B. H., West Newton.
1917 Draper, B. H. Bristow, Hopedale.
1899 Draper, George A., Hopedale.
1896 Dreer, William F., Philadelphia, Pa.
1897 Dumaresq, Herbert, Chestnut Hill.
1899 Duncan, James L., New York, N. Y.
1902 Duncan, John W., Spokane, Wash.
1896 Dunlap, James H., Nashua, N.H.
1915 Dunn, Stephen Troyte, F.L.S., F.R.G.S., Kew, England.
1915 Dupee, William Arthur, Milton.
1909 Dupuy, Louis, Whitestone, L. I., N. Y.
1880 Dutcher, Frank J., Hopedale.
1917 Dutcher, Miss Grace M., Hopedale.
1902 Dyer, Herbert H., Arlington.

1912 Eaton, Harris D., Southborough.
1911 Edgar, Mrs. Rose H., Waverley.
1912 Edgar, William Percival, Jamaica Plain.
1895 Eldredge, H. Fisher, Boston.
1887 Elliott, Mrs. John W., Boston.
1888 Elliott, William H., Brighton.
1903 Ellsworth, J. Lewis, Worcester.
1907 Emerson, Nathaniel W., M.D., Boston.
1917 Emmons, Mrs. R. M., 2nd, Boston.
1894 Endicott, William, Boston.
1899 Endicott, William C., Danvers.
1915 Ernst, Mrs. Harold C., Jamaica Plain.
1897 Estabrook, Arthur F., Boston.
1905 Estabrook, Mrs. Arthur F., Boston.
1907 Eustis, Miss Elizabeth M., Brookline.
1907 Eustis, Miss Mary St. Barbe, Brookline.
1914 Evans, Mrs. Robert D., Boston.

1915 Fairbanks, Charles F., Milton.
1881 Fairchild, Charles, New York, N. Y.
1877 Falconer, William, Pittsburg, Pa.
1884 Farlow, Lewis H., Boston.
1896 Farnsworth, Mrs. William Dedham.
1890 Farquhar, James F. M., Roslindale.
1891 Farquhar, John K. M. L., Roxbury.
1915 Farquhar, Mrs. John K. M. L., Roxbury.

1884 Farquhar, Robert, North Cambridge.
1873 Faxon, John, Quincy
1899 Fay, H. H., Woods Hole.
1908 Fay, Wilton B., West Medford.
1914 Fearing, George R., Jr., Boston.
1917 Fenno, Mrs. Pauline Shaw, Rowley.
1899 Fessenden, George B., Allston.
1917 Fessenden, Sewell H., Boston.
1883 Fewkes, Arthur H., Newton Highlands.
1904 Finlayson, Duncan, Jamaica Plain.
1892 Finlayson, Kenneth, Jamaica Plain.
1901 Fisher, Peter, Ellis.
1910 Flanagan, Joseph F., Newton.
1882 Fletcher, George V., Belmont.
1883 Fletcher J. Henry, Belmont.
1917 Foot, Nathan Chandler, M.D., Milton.
1914 Forbes, Alexander, M.D., Milton.
1909 Forbes, Charles Stewart, Boston.
1909 Forbes, Mrs. J. Malcolm, Milton.
1914 Forbes, W. Cameron, Westwood.
1909 Forbes, Mrs. William H., Milton.
1917 Fosdick, Lucian J., Boston.
1914 Foster, Alfred D., Milton.
1899 Foster, Charles H. W., Needham.
1917 Foster, Miss Fanny, Newport, R. I.
1885 Fottler, John, Jr., Dorchester.
1881 Fowle, George W., Jamaica Plain.
1914 Fraser, Charles E. K., South Natick.
1911 Freeman, Mrs. James G., Boston.
1910 French, Mrs. Albert M., Reading.
1892 French, S. Waldo, Newtonville.
1893 French, W. Clifford, Brookline.
1917 Frishmuth, Miss Anna Biddle, Boston.
1882 Frohock, Roscoe R., Boston.
1903 Frost, Harold L., Arlington.
1900 Frost, Irving B., Belmont.
1899 Frothingham, Mrs. Louis A., Boston.

1917 Gage, Mrs. Homer, Worcester.
1910 Galloupe, Frederic R., Lexington.
1914 Gannett, Samuel, Milton.
1914 Gardiner, Robert H., Gardiner, Maine.
1901 Gardner, Mrs. Augustus P., Hamilton.
1895 Gardner, George P., Boston.
1899 Gardner, John L., Boston.
1899 Gardner, Mrs. John L., Brookline.
1899 Gardner, William Amory, Groton.
1910 Garland, Mrs. Marie T., Buzzards Bay.
1904 Garratt, Allan V., Holliston.
1899 Gaston, William A., Boston.
1911 Gavin, Frank D., Manchester.
1910 Geiger, Albert, Jr., Brookline.
1911 Gill, Miss Adeline Bradbury, Medford.
1911 Gill, Miss Eliza M., Medford.
1865 Gill, Mrs. E. M., Medford.
1887 Gill, George B., Medford.
1907 Goddard, Samuel J., Framingham.
1904 Goodale, Dr. Joseph L., Boston.
1885 Goodell, L. W., Dwight.
1917 Gordan, Donald, Lincoln.
1899 Gray, Mrs. John C., Boston.
1914 Greene, Edwin Farnham, Boston.
1905 Greenough, Mrs. Charles P., Brookline.
1912 Greenough, Mrs. David S., Jamaica Plain.
1914 Grew, Mrs. Edward S., Boston.

1914 Grew, Edward W., Boston.

1897 Hale, James O., Byfield.
1873 Hall, Edwin A., Cambridgeport.
1912 Hall, Mrs. George G., Boston.
1899 Hall, Jackson E., Cambridge.
1897 Hall, Osborn B., Malden.
1910 Halloran, Edward J., Roxbury.
1917 Hammond, Mrs. E. C., Auburndale.
1913 Handler, Max Paul, South Natick.
1914 Harding, Charles L., Dedham.
1871 Hardy, F. D., Cambridgeport.
1905 Hardy, Miss Susan White, Boston.
1889 Hargraves, William J., Jamaica Plain.
1887 Harris, Thaddeus William, A. M., Littleton, N. H.
1910 Harris, Prof. William Fenwick, Cambridge.
1909 Hart, Francis R., Milton.
1899 Hartshorn, Arthur E., Worcester.
1914 Hartt, Arthur W., Brookline.
1895 Harwood, George Fred, Newton.
1884 Hastings, Levi W., Brookline.
1906 Hauthaway, Edwin D., Sharon.
1914 Havemeyer, Theodore A., New York, N. Y.
1891 Hawken, Mrs. Thomas, Rockland, Me.
1899 Hayward, George P., Chestnut Hill.
1914 Haywood, H. T., Franklin.
1905 Head, Thomas W., Lake Forest, Ill.
1913 Heeremans, F., Lenox.
1903 Hellier, Charles E., Boston.
1888 Hemenway, Augustus, Canton.
1899 Hemenway, Mrs. Augustus, Canton.
1914 Hemenway, Augustus, Jr., Boston.
1884 Henshaw, Joseph P. B., Boston.
1899 Henshaw, Samuel, Cambridge.
1917 Heredia, Carlos, M. de, Lenox.*
1901 Heurlin, Julius, South Braintree.
1894 Hewett, Miss Mary Crane, Cambridge.
1900 Higginson, Francis L., Boston.
1902 Higginson, Mrs. Henry L., Boston.
1866 Hilbourn, A. J. Boston.
1886 Hittinger, Jacob, Belmont.
1911 Hittinger, Richard, Belmont.
1895 Hoitt, Hon. Charles W., Nashua, N. H.
1905 Holbrook, E. Everett, Boston.
1914 Hollingsworth, Valentine, Boston.
1899 Hollingsworth, Z. T., Boston.
1881 Hollis, George W., Allston.
1891 Holmes, Edward J., Boston.
1876 Holt, Mrs. Stephen A., Cambridge.
1900 Holt, William W., Norway, Maine.
1899 Hood, The Hon. Mrs. Ellen, Sheen, Surrey, Eng.
1914 Hornblower, Henry, Boston.
1888 Horsford, Miss Kate, Cambridge.
1912 Horton, Arthur E., Lexington.
1902 Hosmer, Oscar, Wenham.
1907 Houghton, Clement S., Chestnut Hill.
1910 Houghton, Miss Elizabeth G., Boston.
1872 Hovey, Charles H., South Pasadena, Cal.
1884 Hovey, Stillman S., Woburn.
1917 Howard, Everett C., Belchertown.
1904 Howard, Henry M., West Newton.

* Died June 15, 1917.

1896 Howard, Joseph W., Somerville.
1915 Howes, Mrs. Ernest, Boston.
1917 Howes, Osborne, Brookline.
1896 Hubbard, Charles Wells, Weston.
1917 Hubbard, Eliot, Boston.
1865 Hubbard, James C., Everett.
1913 Huebner, H., Groton.
1875 Humphrey, George W., Dedham.
1917 Hunnewell, Mrs. Arthur, Wellesley.
1912 Hunnewell, F. W., 2d., Wellesley.
1893 Hunnewell, Henry Sargent, Wellesley.
1912 Hunnewell, Mrs. Henry S., Wellesley.
1882 Hunnewell, Walter, Wellesley.
1912 Hunnewell, Walter, Jr., Wellesley.
1917 Hunt, Miss Belle, Boston.
1892 Hunt, Dudley F., Reading.
1880 Hunt, William H., Concord.
1904 Hutchins, Rev. Charles Lewis, Concord.

1893 Jack, John George, East Walpole.
1886 Jackson, Charles L., Boston.
1914 Jackson, Mrs. James, Jr., Westwood.
1884 Jackson, Robert T., Peterborough, N. H.
1916 Jahn, Paul H., East Bridgewater.
1916 Jahn, William O., East Bridgewater.
1902 James, Ellerton, Milton.
1902 James, Mrs. Ellerton, Milton.
1913 Jeffries, John Temple L., Cambridge.
1899 Jeffries, William A., Boston.
1865 Jenks, Charles W., Bedford.
1905 Johnson, Arthur S., Boston.
1914 Johnson, Edward C., Boston.
1885 Johnson, J. Frank, Malden.
1907 Jones, Mrs. Clarence W., Brookline.
1897 Jones, Dr. Mary E., Boston.

1897 Kellen, William V., Marion.
1886 Kelly, George B., Jamaica Plain.
1848 Kendall, D.S., Woodstock, Ont.
1891 Kendall, Dr. Walter G., Atlantic.
1868 Kennedy, George G., M. D., Milton.
1909 Kennedy, Harris, M. D., Milton.
1905 Keyes, Mrs. Emma Mayer, Boston.
1891 Keyes, John M., Concord.
1889 Kidder, Charles A., Southborough.
1910 Kidder, Mrs. Henry P., Boston.
1880 Kidder, Nathaniel T., Milton.
1899 Kimball, David P., Boston.
1903 Kimball, Richard D., Waban.
1899 King, D. Webster, Boston.
1899 Kinney, H. R., Worcester.
1906 Kinnicutt, Mrs. Leonard P., Worcester.
1904 Kirkland, Archie Howard, Reading.

1899 Lamb, Horatio A., Milton.
1913 Lancaster, Dr. Walter B., Brookline.
1899 Lanier, Charles, Lenox.
1917 Lapham, Henry G., Brookline.
1895 Lawrence, Amos A., New York, N. Y.
1873 Lawrence, John, Groton.
1899 Lawrence, Rt. Rev. William, Boston.
1895 Lee, Daniel D., Jamaica Plain.
1914 Lee, George C., Westword.
1914 Lee, Mrs. George C., Westwood.
1880 Leeson, Hon. Joseph R., Newton Centre.

1902 Leighton, George B., Monadnock, N. H.
1914 Leland, Lester, Boston.
1914 Leland, Mrs. Lester, Boston.
1871 Lemme, Frederick, Charlestown.
1903 Libby, Charles W., Medford.
1917 Liggett, Louis K., Chestnut Hill.
1899 Little, John Mason, Swampscott.
1899 Locke, Isaac H., Belmont.
1891 Lodge, Richard W., Redlands, Cal.
1897 Loomis, Elihu G., Bedford.
1899 Loring, Augustus P., Beverly.
1905 Loring, David, Boston.
1914 Loring, Miss Katharine P., Prides Crossing.
1914 Loring, Miss Louisa P., Prides Crossing.
1899 Loring, Mrs. William Caleb, Beverly.
1899 Lowell, Abbott Lawrence, Boston.
1902 Lowell, Miss Amy, Brookline.
1903 Lowell, James A., Chestnut Hill.
1903 Lowell, John, Newton.
1904 Lowell, Miss Lucy, Boston.
1917 Luke, Arthur F., West Newton.
1899 Luke, Otis H., Brookline.
1895 Lunt, William W., Hingham.
1914 Lyman, C. Frederic, Boston.
1895 Lyman, George H., Wareham.

1898 Mabbett, George, Plymouth.
1912 McKay, Alexander, Jamaica Plain.
1911 McKenzie, Donald, Chestnut Hill.
1868 Mahoney, John, Boston.
1892 Mallett, E. B., Jr., Freeport, Me.
1884 Manda, W. A., South Orange, N. J.
1873 Mann, James F., Ipswich.
1887 Manning, J. Woodward, Reading.
1884 Manning, Warren H., Brookline.
1909 Marlborough, James, Topsfield.
1913 Marshall, A. A., Fitchburg.
1876 Marshall, Frederick F., Everett.
1898 Marston, Howard, Brookline.
1917 Martin, Edwin S., Chestnut Hill.
1899 Mason, Miss Ellen F., Boston.
1896 Mason, Col. Frederick, Taunton.
1914 Mathews, Miss Elizabeth Ashby, Newton Center.
1901 Matthews, Nathan, Boston.
1906 Maxwell, George H., Newton.
1917 Mead, Francis V., West Somerville.
1902 Melvin, George, South Framingham.
1905 Meredith, J. Morris, Topsfield.
1881 Merriam, Herbert, Weston.
1917 Methven, James, Readville.
1884 Metivier, James, Waltham.
1914 Meyer, George von L., Hamilton.
1914 Mifflin, George H., Boston.
1914 Miller, Peter M., Mattapan.
1888 Milmore, Mrs. Joseph, Washington, D. C.
1917 Mink, Oliver W., Boston.
1915 Minot, Mrs. Charles S., Readville.
1908 Minot, Laurence, Boston.
1892 Monteith, David, Hyde Park, Vt.
1896 Montgomery, Alexander, Natick.
1902 Montgomery, Alexander, Jr., Natick.
1896 Moore, George D., Arlington.
1881 Moore, John H., Concord.
1897 Morgan, George H., New York, N. Y.

1914 Morgan, Mrs. J. P., New York, N. Y.
1913 Morison, Robert S., Cambridge.
1899 Morse, John T., Boston.
1909 Morse, John Torrey, 3d., Boston.
1910 Morse, Lewis Kennedy, Boxford.
1913 Morse, Robert C., Milton.
1900 Morse, Robert M., Jamaica Plain.
1914 Morss, Charles A., Chestnut Hill.
1914 Morss, Mrs. Charles A., Chestnut Hill.
1902 Morton, James H., Huntington, N. Y.
1896 Moseley, Charles H., Roxbury.
1909 Moseley, Charles W., Newburyport.
1896 Moseley, Frederick Strong, Newburyport.
1914 Munroe, Howard M., Lexington.
1900 Murray, Peter, Fairhaven.
1897 Mutch, John, Waban.

1917 Neal, James A., Brookline.
1899 Nevins, Mrs. David, Methuen.
1914 Newbold, Frederic R., New York, N. Y.
1874 Newman, John R., Winchester.
1874 Newton, Rev. William W., Pittsfield.
1914 Nicholson, William R., Framingham.
1906 Nickerson, William E., Cambridge.
1914 Norman, Mrs. Louisa P., Newport, R. I.
1881 Norton, Charles W., Allston.

1912 O'Conner, John, Brookline.
1898 Olmsted, Frederick Law, Jr., Brookline.
1892 Olmsted, John C., Brookline.
1898 Orpet, Edward O., Chico, Cal.
1917 Osgood, Miss Fanny C., Hopedale.

1909 Page, George, Newton Highlands.
1909 Page, George William, South Lincoln.
1900 Page, Mrs. Henrietta, Cambridge.
1884 Paige, Clifton H., Mattapan.
1914 Paine, Robert Treat, 2d, Boston.
1908 Parker, Augustine H., Dover.
1913 Parker, Edgar, North Easton.
1911 Parker, Edward, North Easton.
1915 Parker, Miss Eleanor S., Bedford.
1917 Parkhurst, Lewis, Winchester.
1891 Parkman, Henry, Boston.
1899 Parsons, John E., Lenox.
1914 Patten, Miss Jane B., South Natick.
1897 Patten, Marcellus A., Tewksbury.
1909 Peabody, Francis, Milton.
1909 Peabody, Mrs. Francis, Milton.
1905 Peabody, Frank E., Boston.
1899 Peabody, George A., Danvers.
1881 Peabody, John E., Salem.
1907 Peirce, E. Allan, Waltham.
1916 Peirce, Edward R., Wellesley Farms.
1914 Peirson, Charles Lawrence, Boston.
1915 Penn, Henry, Brookline.
1899 Pentecost, Mrs. Ernest Harvey, Topsfield.
1873 Perry, George W., Malden.
1917 Peterson, George H., Fair-Lawn, N. J.
1899 Pfaff, Col. Charles, South Framingham.
1900 Phillips, John C., North Beverly.

1899 Phillips, Mrs. John C., North Beverly.
1899 Phillips, William, North Beverly.
1895 Pickman, Dudley L., Boston.
1902 Pickman, Mrs. Ellen R., Boston.
1881 Pierce, Dean, Brookline.
1892 Pierce, George Francis, Neponset.
1905 Pierce, Wallace L., Boston.
1905 Pierson, Frank R., Tarrytown, N. Y.
1914 Pingree, David, Salem.
1900 Pond, Preston, Winchester.
1892 Porter, James C., Wollaston.
1884 Pratt, Laban, Dorchester.
1914 Pratt, Waldo E., Wellesley Hills.
1898 Pray, James Sturgis, Cambridge.
1899 Prendergast, James M., Boston.
1858 Prescott, Eben C., New York, N. Y.
1914 Preston, Andrew W., Swampscott.
1903 Preston, Howard Willis, Providence, R. I.
1911 Priest, Lyman F., Gleasondale.
1912 Proctor, Henry H., Boston.
1901 Proctor, Thomas E., Boston.
1899 Putnam, George, Manchester.
1900 Putnam, George J., Brookline.

1886 Quimby, Hosea M., M.D., Worcester.

1889 Rand, Harry S., North Cambridge.
1908 Rand, Miss Margaret A., Cambridge.
1903 Rawson, Herbert W., Arlington.
1882 Ray, James F., Franklin.
1890 Raymond, Walter, Pasadena, Cal.
1891 Read, Charles A., Manchester.
1902 Reardon, Edmund, Cambridge.
1892 Reardon, John B., Boston.
1912 Reiff, William, Forest Hills.
1905 Remick, Frank W., West Newton.
1889 Rice, George C., Worcester.
1887 Rich, William P., Chelsea.
1876 Richards, John J., Brookline.
1899 Richardson, Mrs. F. L. W., Charles River Village.
1912. Richardson, H. H., Brookline.
1900 Richardson, Dr. William L., Boston.
1905 Riggs, William Allan, Auburndale.
1917 Riley, Charles E., Newton.
1886 Ripley, Charles, Dorchester.
1892 Ripley, Ebed L., Hingham Centre.
1903 Robb, Russell, Concord.
1909 Roberts, Miss Anna B., Boston.
1909 Robinson, Alfred E., Lexington.
1871 Robinson, John, Salem.
1900 Rodman, Miss Mary, Concord.
1911 Rogers, Dexter M., Allston.
1914 Rogers, Dudley P., Danvers.
1899 Rogers, Mrs. Jacob C., Peabody.
1900 Roland, Thomas, Nahant.
1910 Ross, Harold S., Hingham.
1895 Rothwell, James E., Brookline.
1899 Roy, David Frank, Marion.
1881 Ruddick, William H., M. D., South Boston.
1917 Rueter, Mrs. C. J., Jamaica Plain.
1875 Russell, George, Woburn.
1900 Russell, James S., Milton.
1914 Russell, Mrs. Robert S., Boston.

1893 Salisbury, William C. G., Brookline.
1915 Saltonstall, Mrs. Caroline S., Milton.
1912 Saltonstall, John L., Beverly.

1912 Saltsonstall, Mrs. John L., Beverly.
1899 Saltonstall, Richard M., Chestnut Hill.
1898 Sanger, Mrs. George P., Boston.
1900 Sargent, Andrew Robeson, Brookline.
1870 Sargent, Charles S., Brookline.
1899 Sargent, Mrs. Charles S., Brookline.
1902 Sargent, Charles Sprague, Jr., Brookline.
1899 Sargent, Mrs. Francis W., Wellesley.
1896 Scorgie, James C., Cambridge.
1864 Scott, Charles, Newton.
1895 Sears, Miss Clara E., Boston.
1899 Sears, Dr. Henry F., Boston.
1914 Sears, Horace S., Weston.
1899 Sears, Mrs. J. Montgomery, Boston.
1898 Sharp, Miss Helen, Boston.
1914 Shattuck, Dr. Frederick C., Boston.
1914 Shattuck, Mrs. Frederick C., Boston.
1899 Shaw, Francis, Wayland.
1914 Shaw, Henry S., Milton.
1899 Shaw, Mrs. Robert G., Wellesley.
1901 Shea, James B., Jamaica Plain.
1906 Sherman, J. P. R., Newton.
1865 Shorey, John L., Lynn.
1892 Shuman, Hon. A., Boston.
1901 Shurtleff, Josiah B., Revere.
1893 Siebrecht, H. A., New Rochelle, N. Y.
1917 Silber, Miss Charlotte G., Needham.
1917 Silsbee, Miss Katharine E., Boston.
1899 Sleeper, Henry Davis, Boston.
1903 Smiley, Daniel, Lake Mohonk, N. Y.
1888 Smith, Charles S., Lincoln.
1872 Smith, Edward N., San Francisco, Cal.
1911 Smith, John L., Swampscott.
1888 Smith, Thomas Page, Waltham.
1874 Snow, Eugene A., Cambridge.
1899 Sohier, Col. William D., Beverly.
1908 Spaulding, John T., Prides Crossing.
1908 Spaulding, William S., Prides Crossing.
1897 Sprague, Isaac, Wellesley Hills.
1884 Stearns, Charles H., Brookline.
1893 Stearns, Frank W., Newton.
1896 Stedman, Henry R., M. D., Brookline.
1914 Stevens, Mrs. Nathaniel, North Andover.
1885 Stewart, William J., Winchester.
1901 Stone, Charles A., Newton.
1889 Stone, Charles W., Boston.
1910 Stone, Mrs. Francis H., South Dartmouth.
1914 Stone, Galen L., Brookline.
1896 Stone, Prof. George E., Amherst.
1849 Stone, George F., Chestnut Hill.
1914 Stone, J. Winthrop, Watertown.
1914 Stone, Nathaniel H., Milton.
1917 Storey, Moorfield, Boston.
1905 Storrow, James J., Boston.
1905 Stratton, Charles E., Boston.
1906 Strout, Charles S., Biddeford, Me.
1914 Sturgis, Miss Evelyn R., Manchester.
1902 Sturgis, Richard Clipston, Boston.
1916 Sturtevant, Miss Grace, Wellesley Farms.
1910 Sullivan, Martin, Jamaica Plain.
1912 Swan, Charles H., Jamaica Plain.
1891 Sweet, Everell F., Malden.

1916 Swett, Raymond W., Saxonville.
1904 Sylvester, Edmund Q., Hanover.

1899 Taylor, Charles H., Boston.
1900 Taylor, Mrs. Thomas, Jr., Columbia, S. C.
1913 Tedcastle, Mrs. Arthur W., Hyde Park.
1896 Tenney, Charles H., Methuen.
1917 Thacher, Miss Elizabeth B., Roxbury.
1912 Thatcher, Arthur E., Bar Harbor, Me.
1898 Thatcher, William, Brookline.
1899 Thayer, Mrs. Alice R., Boston.
1900 Thayer, Mrs. Bayard, South Lancaster.
1899 Thayer, Mrs. Eugene V. R., South Lancaster.
1903 Thayer, Henry J., Boston.
1899 Thayer, John E., South Lancaster.
1899 Thayer, Mrs. John E., South Lancaster.
1899 Thayer, Mrs. Nathaniel, Lancaster.
1899 Thiemann, Hermann, Owosso, Mich.
1899 Thomas, W. B., Manchester.
1910 Thurlow, George C., West Newbury.
1913 Thurlow, Winthrop H., West Newbury.
1874 Tolman, Miss Harriet S., Boston.
1896 Toppan, Roland W., Malden.
1899 Tower, Miss Ellen May, Lexington.
1901 Tower, Mrs. Helen M., Cambridge.
1914 Towle, L. D., Newton.
1893 Trepess, Samuel J., Glencove, L. I., N. Y.
1917 Tufts, Bowen, Medford.
1910 Turner, Chester Bidwell, Stoughton.
1914 Tyler, Charles H., Boston.

1910 Underwood, Henry O., Belmont.
1901 Underwood, Loring, Belmont.

1917 Van Brunt, Mrs. Agnes, Readville.
1873 Vander-Woerd, Charles, Waltham.
1899 Vaughan, William Warren, Boston.
1884 Vinal, Miss Mary L., Somerville.

1916 Wagstaff, Archibald, Wellesley Hills.
1909 Wainwright, Arthur, Milton.
1849 Wakefield, E. H., Cambridge.
1876 Walcott, Henry P., M. D., Cambridge.
1895 Waldo, C. Sidney, Jamaica Plain.
1914 Walker, William B., Manchester.
1896 Walsh, Michael H., Woods Hole.
1901 Waltham, George C., Dorchester.
1907 Walton, Arthur G., Wakefield.
1902 Warburton, Chatterton, Fall River.
1912 Wardwell, Mrs. T. Otis, Haverhill.
1894 Ware, Miss Mary L., Boston.
1909 Warren, Bentley W., Boston.
1889 Watson, Benjamin M., Jamaica Plain.
1884 Watson, Thomas A., East Braintree.
1914 Watters, W. F., Boston.
1905 Webster, Edwin S., Chestnut Hill.
1914 Webster, Mrs. Edwin S., Chestnut Hill.

1905 Webster, Frank G., Boston.
1907 Webster, George H., Haverhill.
1896 Webster, Hollis, Cambridge.
1905 Webster, Laurence J., Holderness, N. H.
1909 Weeks, Andrew Gray, Marion.
1902 Welch, Edward J., Dorchester.
1914 Weld, Mrs. Charles G., Brookline.
1884 Weld, Christopher Minot, Readville.
1917 Weld, Rudolph, Boston.
1899 Weld, Gen. Stephen M., Wareham.
1914 Weld, Mrs. Stephen M., Wareham.
1912 Wellington, Mrs. Arthur W., Boston.
1917 Wellington, William H., Boston.
1882 West, Mrs. Maria L., Neponset.
1887 Wheeler, Frank, Concord.
1889 Wheeler, James, Natick.
1897 Wheeler, Wilfrid, Concord.
1865 Whitcomb, William B., Medford.
1901 White, Mrs. Charles T., Boston.
1899 White, George R., Boston.
1909 White, Harry K., Milton.
1917 Whitehouse, Mrs. Francis M., Manchester.
1905 Whitman, William, Brookline.
1894 Whitney, Arthur E., Winchester.
1894 Whitney, Ellerton P., Milton.
1899 Whitney, Henry M., Cohasset.
1917 Whittemore, Charles, Cambridge.
1915 Wigglesworth, Frank, Milton.
1899 Wigglesworth, George, Milton.
1863 Wilbur, George B., Boston.
1889 Wilde, Mrs. Albion D., West Roxbury.
1881 Wilder, Edward Baker, Dorchester.
1899 Williams, Miss Adelia Coffin, Roxbury.
1905 Williams, George Percy, Boston.
1899 Williams, John Davis, Boston.
1905 Williams, Mrs. J. Bertram, Cambridge.
1905 Williams, Mrs. Moses, Brookline.
1911 Williams, Ralph B., Dover.
1915 Wilson, E. H., Jamaica Plain.
1914 Wilson, Fred A., Nahant.
1881 Wilson, William Power, Boston.
1917 Winslow, Arthur, Boston.
1905 Winsor, Robert, Weston.
1906 Winter, Herman L., Portland, Me.
1914 Winthrop, Grenville L., Lenox.
1914 Winthrop, Mrs. Robert, New York, N. Y.
1914 Winthrop, Mrs. Robert C., Jr., Boston.
1870 Wood, William K., Franklin.
1905 Woodberry, Miss E. Gertrude, North Cambridge.
1905 Woodbury, John, Canton.
1906 Woodward, Mrs. Samuel Bayard, Worcester.
1917 Wright, George S., Watertown.
1900 Wyman, Windsor H., North Abington.

ANNUAL MEMBERS.

1913 Adams, Charles F., Jamaica Plain.
1896 Anderson, George M., Milton.

1912 Babcock, Miss Mabel Keyes, Wellesley Hills.
1911 Bacon, Augustus, Roxbury.
1915 Baker, Mrs. G. B., Chestnut Hill.
1898 Barr, John, South Natick.
1916 Barron, Leonard, Garden City, N. Y.
1917 Beal, Thomas P., Jr., Boston.
1893 Bigelow, Mrs. Nancy J., Southborough.
1917 Blodgett, Mrs. John, Beach Bluff.
1917 Bögholt, Christian M., Newport, R. I.
1901 Bradley, Miss Abby A., Hingham.
1913 Bradley, Miss Julia H., Roxbury.
1873 Breck, Charles H., Newton.
1902 Breed, Edward W., Clinton.
1908 Briggs, Frank P., Ayer.
1909 Brigham, Mrs. Clifford, Milton.
1914 Brown, F. Howard, Marlboro.
1916 Brown, Mrs. G. Winthrop, Chestnut Hill.

1914 Campbell, Ernest W., Wollaston.
1910 Camus, Emil, Boston.
1917 Carlquist, Sigurd W., Lenox.
1904 Chandler, Alfred D., Brookline.
1917 Chase, H. F., Andover.
1917 Child, H. Walter, Boston.
1910 Churchill, Charles E., Rockland.
1916 Clark, Schuyler S., Brookline.
1914 Colt, James D., Chestnut Hill.
1907 Colt, Mrs. James D., Chestnut Hill.
1917 Conant, Mrs. William C., Boston.
1917 Coolidge, Mrs. W. H., Boston.
1915 Copson, William A., Roslindale.
1914 Crocker, Mrs. George Glover, Boston.
1914 Crocker, Joseph Ballard, Chatham.
1914 Crompton, Miss Mary A., Worcester.
1881 Crosby, J. Allen, Jamaica Plain.
1917 Curtis, Allen, Boston.
1875 Curtis, Joseph H., Boston.
1914 Cushing, Mrs. Harvey, Brookline.
1912 Cutler, Mrs. N. P., Newton.
1906 Cutting, Mrs. Isabelle Ladd, Roxbury.

1910 Dahl, Frederick William, Roxbury.
1917 Dalton, Philip S., Milton.
1889 Davis, Frederick S., West Roxbury.
1911 Dolansky, Frank J., Lynn.
1897 Dorr, George B., Boston.

1916 Estabrooks, Dr. John W., Wollaston.
1903 Evans, Frank H., Malden.

1902 Farlow, Mrs. William G., Cambridge.
1917 Farr, Mrs. Betty K., Stoneham.
1917 Fiske, David L., Grafton.
1901 Fiske, Harry E., Wollaston.
1894 Fitzgerald, Desmond, Brookline.

1917 Flood, Mrs. Mary, Woburn.
1903 Freeman, Miss Harriet E., Boston.
1905 Fuld, Maurice, New York, N.Y.

1912 Gage, L. Merton, Groton.
1912 Goodwin, Mrs. Daniel, East Greenwich, R. I.
1917 Gordon, George, Beverly.
1917 Graton, Louis, Randolph.
1900 Grey, Robert Melrose, Belmont, Cuba.
1897 Grey, Thomas J., Chelsea.

1908 Hamilton, Mrs. George Langford, Magnolia.
1912 Hardy, John H., Jr., Littleton.
1894 Hatfield, T. D., Wellesley.
1917 Hathaway, Walter D., New Bedford.
1910 Hayward, Mrs. W. E., Ipswich.
1891 Heustis, Warren H., Belmont.
1916 Hibbard, Miss Ann, West Roxbury.
1914 Higginson, Mrs. Alexander H., Manchester.
1902 Hildreth, Miss Ella F., Westford.
1902 Hill, Arthur Dehon, Boston.
1884 Hill, J. Willard, Belmont.
1912 Hollingsworth, Mrs. Sumner, Boston.
1913 Holmes, Eber, Montrose.
1913 Houghton, Mrs. Clement S., Chestnut Hill.
1917 Howard, W. D., Milford.
1900 Howden, Thomas, Hudson.
1917 Howe, Henry S., Brookline.
1902 Hubbard, Allen, Newton Centre.
1893 Hubbard, F. Tracy, Brookline.

1913 Jenkins, Edwin, Lenox.
1916 Jenks, Albert R., Springfield.
1903 Johnston, Robert, Lexington.

1898 Kelsey, Harlan P., Salem.
1898 Kennard, Frederic H., Newton Centre.
1912 Kirkegaard, John, Bedford.

1889 Lancaster, Mrs. E. M., Roxbury.
1900 Lawson, Joshua, Marshfield.
1914 Leach, C. Arthur, South Hamilton.
1914 Leary, Dr. Timothy, Jamaica Plain.
1917 Leonard, John E., Wellesley.
1904 Leuthy, A., Roslindale.
1902 Lewis, E. L., Taunton.
1896 Lincoln, Miss Agnes W., Medford.
1901 Loring, Mrs. Thacher, Boston.
1896 Loring, William C., Beverly.
1903 Lumsden, David, Ithaca, N. Y.

1912 McCarthy, Nicholas F., South Boston.
1904 MacMulkin, Edward, Boston.
1890 Manning, A. Chandler, Wilmington.
1917 Meader, H. E., Dover, N. H.
1917 Mixter, Dr. Samuel J., Boston.
1914 Morse, Frank E., Auburndale.
1913 Murray, Peter, Manomet.

1916 Nehrling, Prof. Arno H., Crawfordsville, Ind.
1895 Nicholson, William, Framingham.
1904 Nicol, James, Quincy.
1903 Nixon, J. Arthur, Taunton.

1913 O'Brien, Mrs. Edward F., Brookline.

1915 Parker, A. S., Stoneham.
1914 Parker, Miss Charlotte E., Ipswich.
1906 Parker, Eliab, Roxbury.
1892 Parker, Walter S., Reading.
1909 Parker, W. Prentiss, Roxbury.

1908 Peabody, Mrs. W. Rodman, Readville.
1914 Pembroke, A. A., Beverly.
1898 Pierce, Mrs. F. A., Brookline.
1902 Pritchard, John, Bedford Hills, N. Y.
1912 Proctor, Dr. Francis I., Wellesley.
1883 Purdie, George A., Wellesley Hills.
1913 Putnam, Frank P., North Tewksbury.

1906 Rane, Prof. F. W., Waban.
1897 Rea, Frederic J., Norwood.
1912 Reed, H. B., Auburndale.
1914 Rees, Ralph W., Ithaca, N. Y.
1893 Rich, Miss Ruth G., Dorchester.
1888 Rich, William E. C., Ocean Park, Maine
1900 Robb, Peter B., Whitinsville.
1893 Robinson, Walter A., Arlington.
1917 Rooney, John P., New Bedford.
1915 Rosenthal, Wolf, Boston.
1892 Ross, Henry Wilson, Newtonville.
1903 Ross, Walter D., Worcester.
1909 Russell, Charles F., Weston.
1910 Rust, William C., Brookline.

1907 Sanborn, Edward W., Boston.
1897 Sander, Charles J., Brookline.
1875 Saunders, Miss Mary T., Salem.
1896 Searles, E. F., Methuen.
1910 Sears, Prof. F. C., Amherst.
1907 Seaver, Robert, Jamaica Plain.
1886 Sharples, Stephen P., Cambridge.
1907 Sim, William, Cliftondale.
1915 Slamin, John, Wellesley.
1910 Smith, D. Roy, Boston.
1914 Smith, George N., Wellesley Hills.
1914 Spaulding, Mrs. Samuel S., Springfield Center, N. Y.
1914 Sprague, George H., Ipswich.
1917 Stephen, A. L., Waban.
1914 Stevenson, Robert H., Readville.
1914 Storey, Mrs. Richard C., Boston.
1914 Sturgis, Miss Lucy Codman, Boston.
1904 Symmes, Samuel S., Winchester.

1869 Tailby, Joseph, Wellesley.
1914 Thayer, John E., Jr., Lancaster.
1909 Tracy, B. Hammond, Wenham.
1913 Tuckerman, Bayard, Ipswich.
1907 Turner, Everett P., Arlington.

1911 Ufford, Charles A., Dorchester.

1881 Vaughan, J. C., Chicago, Ill.

1915 Wadsworth, Ralph E., Northboro.
1902 Ware, Horace E., Milton.
1917 Warren, Miss Cornelia, Waltham.
1914 Washburn, Paul, Boston.
1914 Waterer, Anthony, 3d, Philadelphia, Pa.
1914 Waterer, Hosea, Philadelphia, Pa.
1889 Welch, Patrick, Dorchester.
1915 Wetterlow, Eric H., Manchester.
1909 Wheeler, George F., Concord.
1897 Wheeler, Henry A., Newtonville.
1917 White, Mrs. Joseph H., Brookline.
1901 Wilder, Miss Grace S., Dorchester.
1897 Wilkie, Edward A., Newtonville.
1913 Williams, Mrs. Emile F., Cambridge.
1889 Winter, William C., Mansfield.

TRANSACTIONS

OF THE

MASSACHUSETTS HORTICULTURAL SOCIETY

FOR THE YEAR 1917

PART I

PUBLISHED BY THE SOCIETY
BOSTON
NINETEEN HUNDRED AND SEVENTEEN

TRANSACTIONS

OF THE

MASSACHUSETTS HORTICULTURAL SOCIETY

FOR THE YEAR 1917

PART II

PUBLISHED BY THE SOCIETY
BOSTON
NINETEEN HUNDRED AND EIGHTEEN

TRANSACTIONS

OF THE

Massachusetts Horticultural Society

FOR THE YEAR 1918

PART I

BOSTON
PRINTED FOR THE SOCIETY
NINETEEN HUNDRED AND EIGHTEEN

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* Communications to the Secretary, on the business of the Society, should be addressed to him at Horticultural Hall, Boston.

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Massachusetts Horticultural Society.

1918.

The Transactions of the Society are issued annually in two parts under the direction of the Committee on Lectures and Publications.

Communications relating to the objects of the Society, its publications, exhibitions, and membership, may be addressed to William P. Rich, Secretary, Horticultural Hall, No. 300 Massachusetts Avenue, Boston, Massachusetts.

Fred A. Wilson, *Chairman*
Thomas Allen
John K. M. L. Farquhar
} *Committee on Lectures and Publications.*

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THE INAUGURAL MEETING, JANUARY 12, 1918.

TRANSACTIONS

OF THE

Massachusetts Horticultural Society.

1918, PART I.

INAUGURAL MEETING.

The Inaugural Meeting of the Massachusetts Horticultural Society for the year 1918 was held at Horticultural Hall, Boston, on Saturday, January 12, at twelve o'clock, with President Saltonstall in the Chair.

The call for the meeting was read by the Secretary and the record of the previous meeting was read and approved. The President then proceeded to deliver his Inaugural Address.

Inaugural Address of President Saltonstall.

Ladies and Gentlemen,

Members of the Massachusetts Horticultural Society:

It has been a great pleasure to me to serve as your President for the past two years. It was certainly my intention to retire with the close of last year, but it was represented to me that several of my predecessors had served three years; that it was a year filled with difficulties arising from the war and that under the circumstances I owed it to the Society to continue in office one more year. For these reasons I shall gladly undertake to serve to my best ability although I believe that rotation in the office of the President of this Society every two years ordinarily is advisable.

The past year has been one of great interest to me and I feel that the result of the work of your Trustees and the various Committees undertaken during the year has not only kept up with the

standard of the past eighty-eight years, but in several respects has shown marked progress.

There have been ten indoor shows during the year. These all will be spoken of in the reports of your Committees.

I want to speak briefly of the Spring Show, the June Outdoor Show, the Special Fruit Show, and of the Children's Garden Show.

We started in early last year to make the March Show especially attractive and we employed for the first time Mr. Chester I. Campbell, the well-known publicity agent, to assist in giving publicity to the Show. The exhibit itself was certainly most attractive. We shall carry in our minds for years the impression made by the lovely exhibits of Acacias and Orchids and flowering bulbs and grouped plants. The exhibits were effectively arranged both as to color and varieties and many who have attended our shows for years were enthusiastic in their praise of this Show. It was a Show that stimulated a real interest in a very large number of people. The paid entrances amounted to $7,383.25, a considerably larger amount than was ever received at any one show given by the Society. Our expenses were large but we made a considerable sum, and the thing not to be overlooked is the fact that we reached a very large number of people. I think it may well be referred to as the biggest and the best show we ever had indoors.

The June Show was featured along quite different lines; our Society in its early history had given shows on the Public Garden and Boston Common, the last in 1873. We wished to exhibit some of our beautiful indoor and outdoor plants and shrubs under more favorable conditions than is possible in the Hall and for this reason secured the spacious grounds of the Arioch Wentworth Institute. It is not necessary to mention the great amount of work which was done in adapting these grounds to the rock garden and pond and the outside planting for it is fresh in the minds of all of us.

The seven large tents with their various special exhibits was the most ambitious venture ever undertaken by our Society in the way of an outdoor show.

The exhibits were certainly most excellent. The Orchid Show was worth traveling miles to see, and the same was true of the Azaleas, the Wisterias, and the Roses. For some reason which I cannot explain we had most uncommonly bad luck on weather.

It was very cold and rainy prior to the Show so that the Rhododendrons were far from their bloom, and to make matters worse it continued to rain almost every day of the Show. It was indeed most depressing. If I remember rightly, the one person who could look pleasant during the last days of the Show was our good friend James Wheeler who did his very best to help us out of our troubles.

The Show was not supported by the public and under the circumstances the result was not surprising although terribly disappointing. Great thanks are due to Mr. Walter Hunnewell and Prof. Charles S. Sargent for their exhibits of Rhododendrons, Azaleas, and Wisterias, to Messrs. John Waterer's Sons Co. of England, for a fine exhibit of Rhododendrons, to Mr. Thomas Roland for the Roses, to Mr. John K. M. L. Farquhar for his collection of new varieties of evergreens, mostly the result of Mr. Wilson's collections in China and Japan in recent years, to Mr. Cooley, Mr. Webster, Julius Roehrs Co., F. J. Dolansky, Mrs. Weld, and several others for the Orchids, to Mr. Sim for his Pansy exhibit, and to numerous other exhibitors all of whom exhibited, without expectation of money prizes.

As one result of this effort, I was obliged to call upon 19 members of our Society who had underwritten various amounts in case of a loss and as a result of their generosity our Society sustained a trifling loss although the amount to be paid up was a good large sum, so large that I think it just as well not to mention it. The chances of bad weather necessarily make a show of this kind more of a venture. I am glad that we gave the Show and certainly hope that it may have done some lasting good to our Society. The Show in itself was certainly most creditable, and the Society is greatly indebteded to Mr. Thomas Allen for his efficient services in connection with the arrangement of the same.

At the Fall Fruit Show given in conjunction with the American Pomological Society and the New England Fruit Show in November there was a fine exhibit of apples and a fair exhibit of pears, grapes, and some other fruits. An instructive series of lectures was given during the progress of the Show. Great interest is apparent in the cultivation of the apple but there seems to be a comparatively little interest in the growing and development of the pear. Years ago in this Society there appears to have been more interest in the pear than in the apple.

I happened to be glancing over the report of the annual meeting in 1866 and mention is there made of an award to Francis Dana for the introduction of the Dana's Hovey, to my mind one of the very nicest pears grown. How long is it, I wonder, since anyone of our members has been awarded a prize for the introduction of so good a pear as that!

The Exhibition of the Products of Children's Gardens was wonderfully successful this year. It showed beyond doubt that the children are interested in the growing of commercial crops, perhaps especially stimulated this year by the war conditions. We believe our annual show for children is specially desirable and should be continued from year to year with such variation in program as to broaden the field of activity.

Now for the coming year. It is certainly for the best interests of our Society to continue our efforts to increase the membership. As a result of our efforts last year we secured 83 new members. We have had a considerable number of deaths but our membership roll has increased from 925 to 979 and a large proportion of the new members were life members.

From figures given me by our Secretary, it appears that our membership in 1875 was 1035 and this I believe was the largest membership of our Society. Now we have only to gain 56 more members to pass that goal and I should like to accomplish that result this year. It ought to be easy. Each member ought to be able to propose at least one member. Why, think of it, the list of Fellows in the Royal Society of London in 1914 was 14,400!

The Catalogue of the Library, I am told, will contain not only a correct list of our books but a subject index for flowers, vegetables, and fruits, giving a classified list of all that pertains to each special subject. It is expected that this will be completed during the year.

The Lectures will be continued and the program already published shows an interesting group of various subjects which will be discussed. These lectures are well attended and certainly must be doing a considerable good in stimulating interest in horticulture.

The fact that our country is now engaged in a serious war which is affecting all industries to a greater or lesser extent has led your Trustees and Committee on Prizes and Exhibitions to carefully

reconsider the schedule program for the shows as first proposed for this year.

We planned some months ago to appropriate about $8500 for prizes for flowers, fruits, and vegetable exhibits and to especially feature a vegetable show in the fall by the giving of much larger money prizes than has been customary lately, but we have been forced to reconsider the advisability of this for various reasons.

In the first place, our income is going to be considerably less, less rentals and less bounty from the State and our necessary expenses are going to be higher, e. g. coal $1000.00 more this year than last, so that it is manifestly necessary and advisible to conserve our resources to the fullest extent. Again, the thought has occurred to us that our Society could and should actively assist in some recognized war charity or work for the benefit of our soldiers and as the best manner of doing this we are planning to make all our important shows Pay Shows, to give no money prizes except in a few special cases where money has been given to be awarded in special ways, and to give all the net receipts to the Red Cross or other as well recognized charity.

We are going to call upon our amateur and professional growers and our wholesale and retail flower dealers to actively participate in undertaking to make these shows a wonderful success and in that way to contribute a goodly sum to the good cause of charity. The more you think of this, the more I trust you will be favorably impressed with our purposes, and the more you will be determined, I hope, to make the shows a great success. We may well say to ourselves in what other ways can we assist to meet the serious consequences of war? Already our Halls have been used for the Red Cross for three months rent free for surgical dressings work.

Should we not be considering whether we cannot do more in encouraging the proper planting and growing of commerical crops?

It is all well enough to stimulate the growing of vegetables, but is not a lot of money wasted doing it as it was done last Spring? If done again this spring, should not proper instruction be given in the matter of fertilizers and the proper method of preparing the ground? If with our resources we could start an advanced course of instruction to teachers in this line of work, it might do much good and save a lot of useless expense.

Could we not also consider the advisability of growing intelligently more of our own vegetable seeds and take care ourselves of this industry which in past years has become an important trade to Germany? In this connection it is interesting to read an old advertisement that appeared in the Worcester Gazette, April 3, 1783.

"GARDEN SEEDS.

To be SOLD, by EDMUND HEARD, in LANCASTER, the following assortment of GARDEN SEEDS, warrented of the last Year's produce, viz.
EARLY PEAS early dwarf kidney, and six week BEANS, early stone TURNIP, early Yorkshire, green Savoy, and winter CABBAGE, early Mogul, and head LETTUCE, PEPPER-GRASS, PARSLEY, RADDISH, CELERY, BEET, ONION, CARROT, PARSNIP, summer and winter SQUASH.
CUCUMBER, MUSK MELON, and PEPPER SEED,
also, White BEANS, brought from the Northward, of a superior Quality for planting in Cornfields.

LANCASTER, MARCH 14, 1783."

We all know how unpleasant it is to find that we have failed to secure a good crop on account of poor seed and possibly this could be rectified if our seeds were grown here at home. Certainly we would be more independent in a time of war as now.

Just one more thought which has occurred to me since the war. Some people look upon the growing of flowers as a pure luxury which ought to be given up during war times. Now I do not agree with this thought and I want to tell you why.

First, we must consider the fact that a very considerable number of men have given up their life work to the study and work of floriculture, a science in itself; of these men many are of mature years and are utterly unfitted for other fields of work, and in many cases dependent on their work for their support. Again, it is

important to keep this industry going for those who will wish to return to it after the war.

Second, a vast amount of plant life in greenhouses would be lost if greenhouses should be given up. These plants in many cases have taken years to grow and perhaps could never be replaced.

Third, flowers surely are not so much of a luxury as costly clothing or jewelry worn chiefly to attract the eye, or the many attractive but not necessary fittings of our homes. If all luxuries are to go, flowers must go with them, but when you consider the great amount of happiness and real pleasure that can be given to the sick and the wounded and those confined to their bed, in some cases far away from home, I say that flowers should be the last of all luxuries to be forced out by dire stress of war.

In conclusion, let me say that I have received the helpful cooperation of all officers and committee members for which I am deeply grateful. I have enjoyed becoming better acquainted with them and shall try to know them even better as we go through this year together and shall hope to retain their confidence and their full support.

At the close of the address the annual reports of the officers and chairmen of the various committees of the Society were called for and presented in the following order:

Report of the Treasurer, Walter Hunnewell.

Report of the Board of Trustees, by the Secretary.

Report of the Committee on Prizes and Exhibitions, James Wheeler, Chairman.

Report of the Committee on Plants and Flowers, William Anderson, Chairman.

Report of the Committee on Fruits, Edward B. Wilder, Chairman.

Report of the Committee on Vegetables, John L. Smith, Chairman.

Report of the Committee on Gardens, Richard M. Saltonstall, Chairman.

Report of the Committee on Children's Gardens, Henry S. Adams, Chairman.

Report of the Delegate to the State Board of Agriculture, Edward B. Wilder.

Report of the Secretary and Librarian.

The various reports were separately accepted with thanks and referred to the Committee on Publications for record in the Transactions of the Society.

The meeting was then dissolved.

William P. Rich,
Secretary.

HORTICULTURAL PAPERS.

MRS. L. S. CHANLER'S ROCK GARDEN

ALPINE PLANTS FOR THE ROCK GARDEN.

By Mrs. L. S. Chanler, Tuxedo Park, N. Y.

Delivered before the Society, with stereopticon illustrations, June 2, 1917.

Alpine plants are a source of endless interest and pleasure to all who know them. The object of what I have to say today is to try and increase your interest in them, be it ever so little. Undoubtedly, many of you who are devoted gardeners have never felt any enthusiasm for alpines and have perhaps even suspected them of being a foolish fad. That is a normal state for those who do not know these plants. I felt that way myself not many years ago and used to ask my English friends not to show me their rock gardens, as I did not understand them.

It is certain that anyone who commences to grow alpines never gives them up. Their charms and fascinations are endless, and though their flowers are usually to be seen only in the spring their growth of foliage rosettes covered with fat buds in many varieties, or laced over with exquisite white markings, as in the encrusted saxifrages, is most lovely at all seasons, and most alpines are evergreen.

About the middle of September, when the great heat is over, these plants like many evergreens put out new shoots and take on an altogether spruce and lively air. Also, many of them bloom again, not with the rich profusion of early summer, but the few late flowers give all the more pleasure because of being rare. A wonderful lace-like plant which blooms from May to December is *Asperula cynanchina.* You see it here draping these rocks in late October. Here is a closer view of it, and later you will see it blooming in early summer. It has all the soft, foamy effect of gypsophila but not gypsophila's bad habit of blooming only once. Here is *Sedum Sieboldii,* also in October. It is a lovely gray and pink plant, and the flowers last a long time.

Gardeners have sometimes objected that our summers are too

hot to grow alpine plants successfully, and this is truly our greatest difficulty. If it is possible to place a rock construction facing north, then our chances of success are greatly increased. But, though our summer sunshine is too ardent, our winter snows are of the very greatest benefit to these little plants. During the winter before last, when my garden in Tuxedo was under a nice blanket of snow for nearly four months, not a plant was lost in the rock garden. Of course, in this country we also sometimes have open winters, but never the warm green Januarys they often get in England, which excite the plants into premature growth and result in many flowers being destroyed. In Tuxedo we have only one plant which has such an early habit that it always starts blooming before Christmas. That plant is *Erica hybrida*, a variety not unlike *Erica carnea*, but daintier, quicker-growing, and with much paler flowers. This picture was taken in October. The buds, of course, increased in size during the warm, sunny days of November.

For all the gray and woolly alpine plants our climate is far better than the English, and we constantly read in the books by Farrer and Robinson about gray-leaved plants damping off and needing the protection of a piece of glass to keep off what they call their rotting rains. A case in point is *Androsace sarmentosa*. A friend brought me a plant of it from Switzerland, and this is what I read about it in Robinson's "Alpine Plants": "This is a Himalayan species, growing at an elevation of over 11,000 feet. The flowers, borne in trusses of ten to twenty, at first sight resemble those of a rosy white-eyed verbena. Like many other woolly-leaved alpines, this is difficult to keep alive through our damp winters. A piece of glass in a slanting position about six inches above the plant preserves it. Care should also be taken to put sandstone, broken fine, immediately under the rosettes of leaves and over the surface of the soil, to keep every part of the plant, except the roots, from contact with the soil. A dry calcareous loam is best. Where limestone can be had to mix with the soil, a much better display of flower and foliage can be obtained. It also helps to keep the plant dry in winter."

So we gave it a dry, well-drained, sunny place, and now this androsace has spread like magic. No pieces of glass could be put

over it, and it needs none. Now it has been divided, and we have dozens, and it has most amusing ways. In the autumn, the outer leaves of each rosette disappear, and the center, which is where the verbena-like flowers are to come, puts on a lovely, gray velvet surface. In June, after flowering, this plant puts out runners like a strawberry. In this picture, the first bit is in bloom in a warm corner between the rocks. Here are the flowers more in detail. They are a pretty shade of pink.

We now have fourteen varieties of androsace thriving, and they vary from *vitallina*, which is only one inch high and golden and easy, to *foliosa*, which is nearly a foot high. These plants have all proved hardy and even easy with us, except *Androsace lactea* and *Androsace villosa*. These two kinds are very tiny and grow slowly. *A. villosa* came through last winter without turning a hair and bloomed beautifully. *Androsace carnea* is a beautiful dark green moss, one inch high, on which appear in April the loveliest rosy flowers. This does better with us than in Mr. Correvon's great alpine collection in Switzerland. It likes leaf-mould and hates lime, and it has even sowed itself. All the androsaces have interesting and beautiful foliage. In some, it is like the tiniest imaginable juniper; in others, there are gray rosettes like house-leeks.

In addition to the many charms and beauties of alpine plants, I feel that they will be of special interest to Americans, because they can be grown without employing a gardener. Wages are already so very high here that only the rich can hope to afford to pay them. Yet there are thousands of flower enthusiasts who would like to garden, if they thought it could be done without much labor or expense. Once reasonably made, a rock garden can be kept up by a woman, even if she is not very strong. Weeding is the principal work, and has to be done carefully and patiently. But as the rock plants are usually grown on a slope or bank, the gardener is not forced to stoop and tire her back. We have rattan seats of different heights, which are kept out of sight, and are most comfortable for weeding. The only other work in a rock garden consists in watering, planting new plants, and saving and sowing seed. This question of sowing seed we will consider a little later.

There are two principal modes of constructing a rock garden. A miniature valley, that is the soil dug out four or five feet and banked up on each side, or, if there is a natural slope, stones laid firmly in it to form irregular steps or shelves, where the plants may be put. Both plans are equally good. In the Botanical Garden at Kew, London, they have the sunken path with high banks on each side, and at the Horticultural Society's Gardens at Wisley, one hour's drive south of London, a big hillside has been used to make shelves and steps, and so show off a great collection of alpines. Here it has been easy to have a waterfall. At Kew they have just a pool next the path here and there. No cement has been used in these constructions, and it has not been found necessary. Cement may be used in retaining walls, as will be shown when that subject is reached, but for a rock garden the weight of earth is usually not too great to be held up by well-placed stones without cement; of course, large stones two or even three feet long are used for the foundations.

For a very small rock garden the bank seems easier and more suitable, but in my own rock garden I have made the little valley which has the advantage of banks facing north and south. Unfortunately, the bed rock was so near the surface soil that we could excavate only about one foot.

It is extremely important to build with solid foundation and a definite plan. The idea that any natural-looking mound of stones heaped together will do for growing alpines is a hopeless mistake, because the plants must have definite and solid protection for their roots. Mr. Farrer says: "Stone in nature is never disconnected; each is always, as it were, a syllable in a sentence. Remember that, urgently: boulder leads to boulder in an ordered sequence." There must be no cracks, air-spaces, or slipping down of the soil. These are absolutely fatal, and it is a thousand times easier to guard against them in the original construction than after a number of plants have started to cover the stones.

When one has decided on a rock garden and has got the stones and earth together at the chosen spot, there is an almost overwhelming temptation to build too quickly, and to put in what plants one has, for the sake of seeing the effect. This is a most dangerous way to proceed. We have suffered from it for years, and have lost

valuable plants in painful efforts at reconstruction. It is all a question of considering the roots of the plants. If they are planted on a slope with nothing much to hold the soil, it is bound to wash away in our heavy rains, and then roots will be uncovered, and plants will die. Alpines, though often less then an inch high need deep earth for their roots. Robinson says these tiny plants often have roots a yard long. Nothing is more certainly fatal than to plant them in a pocket with no depth. They may thrive for a time, but after the first drought, they die.

The pockets or shelves where the plants are to go should not slope down toward the path. They should slope back a little toward the main construction to carry the rain into it. This is hard to achieve, because after the stones are fixed and the soil is in, one adds sand or fertilizer or lime, and, the whole shelf being small, the least addition to the soil will result in the wrong slope. Usually, it occurs in the very beginning, when the soil is being shoveled in. So the builder must not hesitate to take out earth until the levels are perfect. Here are pictures to show the difference: although the quaker ladies looked lovely on the wrong slope, that was only for one year, before the earth had had time to wash away. Also they are the most accommodating of ladies, besides being very lovely. In the second picture, flat shelves can be seen, where the plants can be perfectly happy. This picture shows a well-placed rock in the foreground. It is almost bare, because it has only just been put in, but the shelf or tiny terrace which it holds up, shows well what is meant by a proper level. On the left of the picture, the wrong kind of slope is plainly seen. This has been taken out, and flat pockets put in its place.

In arranging the rocks, care should be taken that none are allowed to overhang. This would prevent the necessary rain reaching the plants underneath the rock. Every part of the rock garden should be so arranged that all the rain will be absorbed by it.

Beside the absolute necessity of making the roots of the plants secure against all disturbances, and the length of the roots must be seen to be believed, the general effect is far better and happier if the levels are made right. It is all the difference between a reposeful picture and a restless one, slipping down, or everlastingly fixed. In this picture, the flat shelves are seen on the left, and on the right

there is a sloping bank, now happily made flat. It must constantly be remembered that the plants and not the stones are the main point in rock gardens. The stones are merely the frame and must be kept from intruding into the picture.

What Mr. Farrer means by "Boulder leads to boulder in an ordered sequence, and treating your rocks as syllables in a sentence to make a coherent whole" is well illustrated in this picture. Several of the stones are disconnected, with the result that water has evidently washed soil from precious roots. Therefore the place is half bare. It will also be noticed that the few plants doing well are the ones with the stones protecting their roots from disturbance.

For the amateur, simply wishing to experiment with the more easily grown rock-plants, so as to find out if he really has a taste for this form of gardening, the sloping bank in which half a dozen stones are partly buried, will do perfectly well as a beginning. It is far easier and pleasanter to begin modestly and gradually expand, than to lay out an ambitious rock work and then find that one has neither the skill nor the inclination to grow the right plants for it.

The bank shown here was only partly devoted to growing alpines; next spring, however, the rocks will be extended, and the annuals will not be there. Of course, there must be no formality about anything in the rock garden, no grass edges or anything of that sort. We do not need the stepping stones so useful in damp England, but a gravel path is useful, and dwarf plants often seed themselves and thrive in it. There is more moisture in the path than anywhere else, as the water is sure to trickle down. So, even though the path plants do occasionally get stepped upon, they are often very handsome.

The whole surface of the rock garden should eventually be covered with plants, but one must be cautious, as some undesirable kinds are too free and are hard to get rid of. It is best, for a time at least, to submit to the ugliness of bare ground than to let one's precious pockets be over run with greedy, seedy plants. This bare ground about rare plants should be covered with small stones or broken rock to prevent evaporation, and they would also prevent stagnant moisture in winter. The stones are not pretty, and

a little soil sprinkled on top of them makes them less conspicuous. When our object is achieved and we have collected enough of the best plants, there will be no bare, stony places to offend our eyes. Here is one approach to the rock garden. Nothing in the least formal, and low plants are better than high ones. These forget-me-nots were glorious, because just beyond them, looking black in the photograph, was a solid mass of that wonderful hardy wall-flower, *Erysimum allioni*. As far as I have been able to discover, there is only one shade of it, a deep rich yellow. It is biennial and grows about a foot high. Here are more forget-me-nots. These are with lilies-of-the-valley, and the whole plantation is surrounded with periwinkle. In the periwinkle we plant that typical alpine, the autumn crocus. I have often smiled as I read about its charms for the rock garden and wondered what these good authors thought of their autumn crocus in May, when it's great coarse leaves appear. By growing them in the periwinkle we are able to hide these leaves as soon as they show signs of drying. We roll them up and hide them under the periwinkle, and there they can dry up without being an eyesore. Here are the crocuses in September.

Visitors, seeing a rock garden for the first time full of blooming alpines, are constantly exclaiming, "These cannot be hardy plants! They are too delicate, too brilliant to have lived all through our icy winters." These *Saxifraga cordifolia* were particularly brilliant last April, a vivid coral pink, and you can see in this picture that there were no leaves on the trees when they bloomed.

Here is another alpine beauty, a *Primula denticulata cashmeriana*. It sows itself, and, given half shade and water during dry weather, it is perfectly easy to grow.

The old-fashioned way of having gardens bare in the early spring, except for narcissus and tulips, has resulted in their being accepted so, as a natural law, and when people hear of twenty or thirty varieties being in bloom in early April they are amazed.

Alpine plants usually bloom in the early spring. In the mountains the summers are very short; often only a few weeks from the time when the snow melts to the first storms of autumn, so the flowers must appear immediately, if they are to ripen seed and continue their species. There are summer-blooming alpines like

the large and lovely family of Campanulas, but, though the *plants* are perfectly hardy and easy to grow, the *flowers* do not survive our July sunshine very long, so that visitors, seeing a rock garden after June, may well be disappointed over the lack of color and brilliance. *Linum perenne* is a lovely summer-flowering plant, rather large perhaps, but the blue flowers succeed each other for a very long time, and the foliage is soft and graceful. These alpine pinks bloom all through June and are the greatest joy because of their fragrance. Their foliage is always an addition, being soft mats of that gray green shade which is so becoming to all flowers.

Here are more June flowers, *Campanula longistyla*, a biennial like the Canterbury bell, but a real beauty and easily raised from seed. The little white flower above is *Silene rupestris*, one of the easiest plants to grow and always an addition wherever it sows itself. The lower white flower is *Arenaria montana*, not at all easy with us, but in the shade it consents to thrive. Above is the foliage of the *Saxifraga cordifolia*, which you saw a few minutes ago.

In April, May, and June, there are always masses of flowers in the rock garden, and the early flowers are after all the ones we enjoy most, after being deprived of them all winter long, and before the heat in the mornings and the mosquitoes in the evening drive us indoors.

Another very important reason why rock gardens should become known in this country is that a rock garden can be made on the smallest piece of ground. My own rock garden, which already boasts of over 350 varieties, is only about 13 yards long and 8 yards wide.

Mr. Reginald Farrer, in his charming book "The Rock Garden," says it is really by far the cheapest and most graceful form of gardening. "It has become, and is hourly still more universally becoming, the pet passion of the man who has small means and only a small plot of ground to play with." And this in England, where labor was so cheap.

Position.

A rock garden does not look well in a landscape or near the formal lines of a building or a road, and it should be put in a secluded

corner, where it can be nursed and enjoyed intimately. The late owner of Holland House, London, was so fond of alpines that he planted small groups among stones on either side of the garden door of that magnificent Elizabethan Palace, where they looked entirely out of place.

The suburban home should have a bit of ground at the back, if its owner wants a rock garden. Stones are bound to look irregular and inharmonious in formal surroundings, as can be seen when rocks are left in a lawn. Harmony with surroundings is the fundamental law of successful gardening.

In a rock garden, one can get closer to nature as she shows herself on the mountains, than in any other way, if one has not the land for woods and streams and pastures. Alpine plants are practically all perennial, permanent, and stationary, not popped in out of a greenhouse only to die in the first frosts. These temporary plants have no individuality, no opportunity to adapt themselves to their surroundings, and though they may be beautiful, they are not interesting. Alpines take time to develop, and show their true character, but once they do this, the happy owner, who has given them their chance, can feel that he has real nature to enjoy, something superior to the learned combinations of the landscape gardener.

As has been said, the rock garden does not look well near a building. But in the back yard of a suburban plot, a rock garden will transform into an actual source of pleasure what is usually the dullest corner.

It is essential to put the rock garden in an open situation and not under the drip and shade of trees or overhanging and greedy shrubs. Shade from a building or wall would do no harm, if it were only for half the day, and it is a great help with our tropical summers to have at least part of the rock garden facing north. Many plants, such as campanulas, mossy saxifrages, and androsaces (rock jasmin) do better in half shade, and the flowers last longer when not exposed to long hours of sunshine. In a small place, if it is found necessary to put the rock garden near a tree, whose roots would be sure to come after the good soil provided for the alpines, a small wall descending as deep, or somewhat deeper, than the roots of the tree, and made of rough concrete, would be a great help in keeping the tree roots in their place.

Edgings.

A rock construction is not by any means the only place in which alpines may be grown with pleasure and success. The larger and more easily grown varieties can be very effectively used for edging plants, and as most of them are more or less evergreen, they look extremely well in that position. Edgings are very important, and a beautiful border without a satisfactory edging is about as pleasing as a beautiful dress without a collar. In Europe, where turf and lawns are very much at home because of the damp climate, and where labor is so cheap, grass edgings are commonly used, but here lawn grass is not at home. It is an artificial and highly expensive decoration, and if it is in narrow strips with edges, which must be constantly trimmed, it hardly seems worth the trouble and expense it costs, especially as it is brown and ugly for nearly half the year here, while in Europe it is always green.

Near a building, as has been said, formal lines are necessary. In such positions cut stone edgings look well and hold up small plants perfectly. Cut stone edgings are expensive, but the expense ends when they are bought. The clipping and trimming of grass edgings never ends. For the greater part of the garden, native stone partly buried and carefully chosen to look more or less even in height will serve perfectly, and as one wishes to cover the edgings with flowering and often evergreen plants, minor irregularities in the stones are soon hidden. Many varieties, such as the evergreen candytuft, double arabis, *Dianthus deltoides*, and *Dianthus plumarius*, forget-me-not, *Campanula carpatica*, *Alyssum saxatile*, etc., etc. do splendidly as edging plants and these are too easy and free growing for the rock garden. They nearly all seed freely and would be a danger to tiny plants one or two inches high. While the rock garden is new, and before many plants have been gotten together, some of these coarser plants could be carefully used on the less desirable parts of the construction, the highest part for instance, which is the most exposed to heat and cold and drought. But care should be taken not to allow them to seed down among the treasures.

Some people think *Oenothera speciosa* a suitable rock plant, but though lovely as edging for a herbaceous border, it is far too free

and vigorous to plant among alpines. Heather, on the other hand, can well be used in both ways. For a formal edging near a house *Erica carnea* has no rival, where box is not hardy. It can stand any amount of winter sun if a few evergreen branches are put over it from December to April, and it can be clipped into a formal shape and is never more than six inches high. Its greatest quality, however, is in the flowers, and the picture shows how freely these are produced. The buds form in September and are plainly to be seen all through the winter, while in April, after the first warm day, they burst into bloom, a lovely warm pink. After a couple of weeks, the flowers turn magenta and are less pretty, but if one is careful to have no clashing color near, they are a joy for nearly a month, and all this during terribly cold and often snowy April days. They are often seen blooming bravely through two inches of snow and seem none the worse when the warm spring sun melts it away. In the rock garden, they are just as valuable.

The same rule applies to these stone edgings as to plants in the rock garden proper, the stones protect the plants from drought and frost and give them a chance to show off their flowers to the best advantage, especially if the stones are gray and the flowers pink.

Wall Gardens.

In laying out a place, if it is larger than a small suburban plot, there are usually slopes more or less steep to be dealt with. These are often ignored, treated as if they were flat, and planted with grass, shrubs, and trees. If the slope is at all steep the water drains off it too fast to allow grass to be green very long in our dry summers. Then one often sees trees and shrubs look as if they were slipping down these banks. Nothing is less reposeful or less satisfying than this effect, and it is far better to face the fact of the slope in laying out the place, and to put in retaining walls. If several such walls are used, one below the others, small terraces are formed, such as one sees in Switzerland and in Italy, and these give far better foothold to whatever plants one desires to grow than a sloping bank with the earth continually washing away from the roots. It is the same principle which we

were considering in the construction of the rock garden. The reader has only to look about his neighborhood to see the slipping down effect of trees and shrubs, and how poor the grass is on a sunny bank.

If, to avoid this, retaining walls are put in, a new field for the planting of alpines appears, and we come to what in England is called Wall Gardening. There dry walls are used. In this country, a dry wall, meaning a wall built of stones without cement, gets pushed out of shape by our frosts and looks in time like a wall in a nightmare, not at all a suitable border for a road or decoration for a lawn. Miss G. Jekyll and other English authorities recommend dry walls most highly, but they have very little frost to contend with. In this country one can manage by having the wall thoroughly cemented at the foundations and for eighteen inches from the ground. Then, if half the other stones are made fast with cement, say roughly every alternate square foot, the other half may be planted and will give an excellent effect, probably quite as good as if it were entirely covered with plants.

It is very important in making such a wall to watch the men constructing it, otherwise they will throw in large stones, instead of earth mixed with small stones, behind the wall. The whole idea of a dry wall is that the plants should be able to root through it into the bank of earth behind. If, when the tender roots push back, they find only stones, the plants will naturally die. It is necessary to enrich the soil and see that it has humus well mixed with it, so that the plants can thrive. In building the dry wall, as much care should be taken to ram down the soil and leave no air spaces as in constructing the rock garden. It is really the same idea, and it is also necessary to have the stones tip upward a little, so that the rain may reach the plants between them. This is called a battered wall and can be done by putting small stones between the front of larger ones and carefully filling and ramming the crevices between the soil. When finished, this should all be perfectly firm.

Many and varied are the plants which can be grown in the retaining wall, and if it faces north our native plants, such as ferns, columbine, the small two-leaved Solomon seal (*Smilacina bifolia*), and violets, with a few harebells, would make a lovely

picture. It is best, as in all gardening, to put a good-sized group of one variety before going on to plant the next. A confusion of several kinds jumbled together would probably look about as artistic as the bouquets thrown into carriages by peasant children abroad. A wonderful help can be had from gray-leaved plants, and among rock plants their names are legion: alyssum, arabis, achillea, artemisia, *Stachys lanata*, and cerastium, to mention a few of the easier kinds.

The common way of repeating the same plants at intervals along a wall is as fatal to the picturesque or natural effect as it is in the herbaceous border. It must have originated in the entirely unimaginative mind of a hard-working gardener, who thought much more of growing plants by the hundred than of observing the ways nature had with them. Nature usually plants in groups and never in rows, let it be noted by the way.

Mr. Robinson says there are many alpine plants now cultivated with difficulty in frames, which any beginner may grow on walls. Now that is certainly encouraging to the beginner considering a wall garden, and then it is such fun to see the delicate and lovely little jewel-like plants so close to one's eyes.

If the retaining wall is not too high, a delightful opportunity is offered by its flat top. In this picture, *Cerastium tomentosum* can be seen draping the top of a low retaining wall, and it makes a pretty fringe or edging for the upright-growing irises. Here is the cerastium not yet in bloom. You can see how it grows between the stones.

Growing Alpines from Seed.

It has been mentioned that among the four principal considerations in keeping up a rock garden are the saving and sowing of seed. This seems to be a job particularly suitable for women. It requires some thought and a good deal of time, as it is very necessary to collect seeds at the right moment, when they are dry, and before they begin to drop, but it is not tiring or hard work, and it is very interesting. All the authorities agree that the best and healthiest plants are those raised from seed, and one's own seed

is the freshest and most amusing to deal with. In this way, one is constantly improving the different varieties by only saving seeds from the best specimens of a given kind.

At present and until the public demands more of the dealers, seeds of many of even the most easily grown varieties must be imported. Fortunately this is easy, not at all like importing Paris gowns, and Mr. Correvon has all the varieties in cultivation for sale at very low prices. There are about six thousand different kinds of plants mentioned in his general catalogue, and nine-tenths of these have been raised from seed at Geneva and are therefore acclimated to low altitudes. It has been our custom to import and sow about fifty varieties each winter, getting them into the ground as soon as possible after New Years. We sow the larger varieties in cold frames and the smaller and more difficult ones in pans or pots, plunged in earth in the cold frames. After sowing, the seeds are covered with snow, as Mr. Correvon says it helps them to germinate. He recommends soil composed of one-third peat, one-third loam, and one-third sand, granitic or lime rubble, according to the variety.

One of the keenest pleasures of the alpine gardener is to visit this frame in the spring and see the hundreds of little new treasures at his disposal. Many, of course, have not come up in such a short time and must be kept over sometimes for another year before they germinate. In that case it is best to remove them to a half-shady place, for if the tiny plants should appear, they might be burnt up during one scorching day in July.

Freshly gathered seed germinates very much more quickly and surely than old seed, so it is best to sow the seed we save ourselves as soon as possible. This also results in the plants making a good show of flowers the following season. After collecting seed from the early-blooming alpines, we usually make a first showing in June, then in July other varieties will have ripened their seed, and we sow again. Some are sown in the open ground, the sturdier kinds like the mountain pinks, *Lychnis flos-cuculi* and columbines; others, smaller and more delicate ones, are sown in the cold frame. The ripening seed looks untidy, and there is one owner of a beautiful rock garden who never allows any seed to ripen. But, until one has enough of a given variety, it seems so much more reasonable

to save and sow the fresh seed than to keep on buying plants. After a couple of years, one could grow a few plants in reserve, solely for the purpose of getting seed from them.

A good deal of leaf mould or humus helps seed to germinate, as it keeps the soil open and porous.

Advantages over England.

We have all heard and read a great deal about the enormous advantages of gardening in England. After gardening there for ten summers, I have come to the conclusion that if the same amount of skill and time were spent here as is spent in England on gardens, we should have very nearly as much garden beauty as they have. Not the same beauty of spreading lawns and hedges of holly and yew, but wonderful flowering trees and shrubs, which either cannot be grown in Europe, or present miserable objects with very few flowers in English gardens. Our glorious laurel I have seen there languishing in pots, and taking into consideration its many and wonderful beauties, there is surely no European shrub to compare with it. Our native rhododendrons and azaleas are also plants of incomparable garden value. In England, beds of peaty soil are made, in which these plants, with some of our andromedas, huckleberries, and lilies, are grown, and as there is difficulty about making them thrive, they are very greatly admired. Here, on the contrary, people worry over box, English ivy, tender retinosporas, and other European varieties, instead of giving a proper place and setting to our own plants.

From lack of knowledge and imagination, European plants and methods have been used in this totally different climate with deplorable results, and vice versa, American plants abroad are often far from being beautiful.

But, if the choice of suitable plants has a great deal to do with poor gardens in America, the lack of trained helpers in gardens has a still more unfortunate effect. A trained gardener gets five or six times the wages here that he is accustomed to receive abroad. And then, who does he have to help him? Instead of under-gardeners, hoping to rise to be heads in their turn, and trained in

garden work from the time they were small boys, he has usually to put up with Italians fresh from working on a railroad track or in an iron foundry. These men often speak little English and have absolutely no knowledge of plant life.

Where there are greenhouses trained helpers are usually found, but in a hardy garden one gardener with men accustomed to the roughest day labor are customary. Now how can it be supposed that beautiful gardens can result from this system? The head gardener is only human, and if he is obliged to do all the planting, sowing of seed, handling of seedlings in their various stages, moving of trees and shrubs, has to remember about all the watering, and pick vegetables and flowers, it is obvious that very much must remain undone.

This situation is also made far worse by the fact that, owing to our hot summers and cold winters, more than one-half of the most important planting has to be done in May. In April, the ground is usually sticky and wet from melting snow, and in June it is too hot.

It has also seemed to me that head gardeners as a rule feel they have done their full duty, if only they can produce in a greenhouse roses and carnations as large and stiff as the average florist has for sale. They are often unashamed of the most deplorable looking borders.

When rich people here learn to care for hardy flowers as they are cared for abroad, our gardens will be just as beautiful, only they will not be so numerous, because the high price of labor makes them impossible, except for the very rich.

This is why I have talked against lawns and clipped edges. If our one and only gardener spends his time tending them, he cannot be growing new plants, however simple their cultivation may be, and it is by continually sowing new seed and adding fresh beauty that our gardens remain interesting.

THE ARNOLD ARBORETUM.

By Edward I. Farrington, Weymouth Heights, Mass.

Delivered before the Society, with stereopticon illustrations, January 12, 1918.

"For a thousand years and then another thousand years, and so on forever," reads the solemn agreement by which the City of Boston enters into contract with Harvard University to care for and perpetuate the Arnold Arboretum in Jamaica Plain, undoubtedly the greatest tree museum in the world. Curiously enough, the great majority of people, even in Boston, know nothing about the Arboretum or its purposes. This is distinctly unfortunate, for the loss is not the Arboretum's, but that of the public which should profit by its work and enjoy its beauty.

Expert landscape gardeners and nurserymen know the Arboretum as a clearing house of knowledge. They use it. The Arnold Arboretum is the only place in this country where data on the comparative hardiness of woody plants covering a long period of years can be found. Perhaps if the Arboretum were not so modest about tooting its own horn, it would receive greater credit for what it has done. Within its borders nature is working miracles which must have a profound effect on all gardens of the future. Every fruit grower has an interest in the Arboretum. Future years will yield finer Apples and Pears and Peaches than any you yet have tasted. They may come from crosses with Chinese trees introduced by Arboretum explorers.

We know little so far about the possibilities of nuts as a food. Yet the time may come, and before long, too, when the whole world will be eating nuts. Practically every nut tree which will grow in this climate is now to be found in the Arnold Arboretum.

As for its value to the home gardens of the country, nobody can estimate it. Every plant brought from foreign lands — and they number thousands — if suited to this climate, is tested and re-

ported upon in the Arboretum trial grounds. In this way the people of the country are protected from losses and discouragements. Where else can the public learn the secrets of the Rhododendrons, the eccentricities of the Azaleas, the varied habits of the Viburnums, and the unexpected values of the Lilacs?

How are all these new things obtained? A book of romantic adventure might be written in answer to that question. Plant hunters sent out by the Arboretum have penetrated to corners of the world where the foot of a white man has never trodden before. The most famous of these plant hunters is Ernest H. Wilson, who has given hundreds of plants to the world through the Arnold Arboretum. How he rolled down a mountain side in western China and lay for weeks in a mission hut is now a well-known story. Among the most notable plants introduced by the Arnold Arboretum are *Azalea Kaempferi*, the tree Lilac, the Sargent Cherry, the climbing Hydrangea, and the Japanese Barberry.

The Arboretum had its origin in the imagination of George B. Emerson and the generosity of James Arnold. Mr. Arnold, a New Bedford merchant, left $100,000 to be used for horticultural and agricultural purposes. Mr. Emerson was one of the trustees in charge of this fund. He it was who formulated the plan by which Harvard University took the bequest and turned over a part of the Bussey farm for an arboretum in which every tree and shrub suited to this climate should be grown. Later an agreement was made with the city of Boston whereby the latter contracted to lay out a system of walks and drives, police the grounds, and pay whatever taxes might be levied. In return the Arboretum was made virtually a part of the park system. This great tree museum now occupies 220 acres of hill, valley, and meadow.

For the most part the trees have been arranged in family groups so that they can be studied to the best advantage. Single individuals of the native trees have been planted far enough away from the groups to make possible their full and free development.

The Arboretum is designed for serious study, yet everywhere the attempt has been made to group the trees and shrubs in such a way that the natural features of the trees may be preserved. Much can be seen by walking or driving around the public roads, but much is also missed. The only way to get all that the Arbore-

tum offers is to leave the main drives for the grass covered paths which lead to the smaller groups. With map at hand, it is an easy matter to locate any general group of trees and shrubs. Yet many of the foreign plants now on trial do not appear. Coming down Bussey Hill, for example; at this point there is a fine collection of Chinese shrubs and close by the celebrated Cedars of Lebanon.

The gates of the Arboretum are open from sunrise until sunset. Everybody is free to enter. You can spend an hour or a day there, with profit and with pleasure. Take your luncheon and eat it on the grass under the waving trees if you care to do so. Follow the grassy paths; they lead to unexpected beauties. You will find every tree and shrub tagged with its right name. Take a note book along and jot down the names of such plants as you would like in your own garden. If you want any special information, stop at the Administration building near the Jamaica Plain entrance, and it will be given you.

This building was erected for the Arboretum by the late Horatio Hollis Hunnewell, whose garden and pinetum at Wellesley are known to all students of trees. Here are thirty-two thousand bound volumes, together with many pamphlets, constituting a library of incomparable value. The herbarium is believed to be the richest and most complete collection of material representing the coniferous plants of the world which has ever been made. It contains also a collection of the woods of North America. The dried specimens are stored in fireproof metal cabinets, and all are so carefully indexed that any one among the hundreds of thousands can be located in less than one minute.

In one corner of the upper floor of the Administration building is the office of Professor Charles S. Sargent, the first and only director of the Arboretum, and the man most responsible for its development. It was Professor Sargent who nursed the institution through its early days of stress and trouble. Nothing but his enthusiasm could have withstood the depressing public indifference and the lack of expert cooperation. It was a big task to lay the foundations of an institution which is to last two thousand years and so on forever. His wisdom and foresight have made it what it is today. His monument has been erected while he yet lives.

The natural way in which interesting specimens are displayed is to be found on the boundary walls, where hardy vines are trained. Not only are the vines themselves offered for study in this way, but the manner in which they can be used to the best advantage is shown. Professor Sargent takes particular pride in the Grape vines growing on the walls, for in his opinion many people fail to realize the decorative qualities of these vines. The Bitter Sweets and many other native vines are also grown.

The only formal planting in the Arboretum is to be found in the shrub garden, near the Forest Hills entrance. Here hardy shrubs in great variety are arranged in parallel beds on the only piece of level ground which the Arboretum boasts. These shrubs have been so placed that the visitor can easily compare all the species of any genus in a short time. In this way he is able to select the particular variety which he may want for any particular purpose. Unfortunately, the space which can be devoted to this collection is too small to contain all the shrubs which can be grown in the Arboretum. The Dogwoods, Rhododendrons, Viburnums, and the like, will be found in other places, usually near the trees to which they are related.

The shrub garden contains probably the best collection of wild Roses in the country.

Among the Roses now growing in the shrub garden, *Rosa multiflora cathayensis* is of particular interest. It is the Rose from which sprang the Crimson Rambler, which has long been cultivated by the Chinese and came to this country by way of Japan and England. Likewise it is the progenitor of the Seven Sisters Rose, which used to be common in country gardens. This Rose is established in the Arboretum, flowering and ripening its fruit every year.

Rosa Hugonis or Father Hugo's Rose was found by a missionary in China and came to this country by way of England. It promises to prove a splendid Rose for New England gardens, being perfectly hardy and bearing oceans of yellow flowers which are set so closely on the branches that they touch. It is a pity that the Arboretum has no room for a complete Rose garden, where every species, variety, and hybrid, old and new, might be cultivated. There is genuine need for just such a garden somewhere and the Arboretum already has a nucleus. How better could any wealthy man

perpetuate his name than by providing the Arboretum with the means of establishing a real Rose garden, such as exists nowhere else in the world.

Some years ago Mr. J. G. Jack, of the Arboretum staff, visited the far East, and although he spent only a short time in Korea, he discovered several interesting new plants, among them *Diervilla florida venusta*, perhaps the handsomest of all the species, varieties, and hybrids of the Weigela. It is a shrub which grows five feet tall, and in Spring is completely covered with dense clusters of rosy-pink flowers from an inch and a half to two inches long. It is perfectly hardy, too, which cannot be said of all the Weigelas. It grows rapidly, and no shrub known bears larger crops of flowers. It is one of the purposes of the Arboretum to search out the best varieties among the different shrubs, testing them for hardiness and reporting on their availability for northern gardens.

Repeated tests have shown that many of the Deutzias, handsome as they are, are not suited to cultivation in New England. It is not often that plants are actually killed, but they are frozen back so hard that they do not bloom. *Deutzia parvifolia*, *Deutzia crenata*, and a few others are known to be perfectly hardy. Several Deutzias from western China are now being tested in the Arboretum, and it is hoped that some of them will prove valuable additions to New England gardens.

The Arnold Arboretum has the largest and most complete collection of Loniceras, or Honeysuckles, in the world, just as Mr. Rehder, of its staff, is the leading Lonicera expert in the world. *Lonicera Korolkovii* is a shrub of peculiar elegance. A bush Honeysuckle with grayish leaves is a novelty. At times this gray is so intense as to be almost blue, while again it is nearer green. View it in the morning when covered with dew, and it looks as though encrusted with a kind of enameled jewelry. Many different Honeysuckles have been tested out at the Arboretum, climbers as well as those having a bush form. Among the newer arrivals is *Lonicera Henryi*, one of the few evergreen climbers hardy in this climate.

Sorbaria arborea is a discovery of Mr. Wilson's. It's a charming shrub if given planty of elbow room. As a matter of fact it will insist upon having all the room it needs, because it just naturally

moves out and smothers anything in its way. The bloom of *Sorbaria arborea* comes along in June, and lasts through most of the Summer. There is an early burst of bloom, but it is seldom that a large number of flowers are open at one time. They make a floral procession which is as interesting as it is pleasing. Judging from the specimens in the Arboretum, this is not a particularly good plant for small gardens, but is excellent for use on large estates.

There would be fewer disappointments if amateurs in general would choose some other variety of Privet than the common California Privet when planting a hedge. There are some sections where California Privet thrives, but in the North it is very likely to be badly winter-killed. If you will visit the shrub garden at the Arboretum you will find half a dozen varieties growing side by side, and can study them at your leisure. Most of the Privets have attractive blossoms if they are not kept trimmed, while in the Fall they yield a profusion of black and blue berries. *Ligustrum Ibota* is a most desirable hedge Privet for this section. It is also attractive when grown as a specimen or in mass planting.

Among the plants introduced by the Arboretum from central and western China, through the explorations of Mr. Wilson, none give greater promise as garden plants for the North than some of the Cotoneasters, of which twenty species and varieties are now established here. *Cotoneaster hupehensis* is a species with very showy flowers and is perhaps the most worthwhile shrub for northern gardens which Mr. Wilson has brought back from the far East. It is handsome in the Fall as well as in the Spring, for then its branches are covered with scarlet, lustrous fruits. Several of the Cotoneasters grow six or eight feet high, while others form dense mats of prostrate stems, but nearly all have dark green and very lustrous leaves, which retain their color until the late Autumn. Besides the collection in the shrub garden, there is another containing the newest Chinese Cotoneasters in a long bed on the southern slope of Bussey Hill.

Spiraea nipponica or *bracteata* is a particularly handsome and hardy Japanese shrub, which is not known in American gardens as well as it should be. The family of Spiraeas is a very large one, and the amateur finds it difficult to choose intelligently among the varieties offered by nurserymen. It will help greatly to make a

little study of the plants found in the Arboretum collection as they come into bloom. You will find that some of the least well known are among the best.

An unusually good specimen of the climbing Hydrangea, *Hydrangea petiolaris*, is to be found growing on the brick wall of the Administration Building, to which it clings as firmly as Ivy. This is also a Japanese plant, and the only climbing vine with conspicuous flowers which can be grown on a wall without artificial support in the Northern States. It can also be used to climb up the trunks of trees, and individuals seventy or eighty feet high are not uncommon. Its value as a wall covering is increased by the early appearance of dark green leaves, which are nearly full grown before there is a sign of a leaf on any of the Virginia Creepers.

Magnolias are among the showiest of flowers, and several varieties have been planted around the Administration Building. *Magnolia macrophylla* is one of the most interesting species. It has the largest leaves and the largest flowers of any tree which grows outside of the tropics. The leaves are over thirty inches long, and eight inches wide, while blossoms a foot in diameter are not unusual. These flowers are creamy white, fragrant, and with a very deep cup. They may be called without exaggeration nature's lodging houses for the rose bugs. I have tipped up one of these blossoms and had scores of these insects come tumbling out. Professor Sargent says that planting this Magnolia in the garden is a good way to trap the rose bugs to keep them away from the Roses.

Of course it is impossible to duplicate at the Arnold Arboretum anything like the wonderful Cherry blossom shows which have long been a feature of Japanese life. Nevertheless, the display along the drive leading from the Forest Hills entrance is worth while going a long distance to see. It is passing strange that more use is not made of these ornamental flowering trees in home gardens. The *Prunus subhirtella*, has perhaps the most beautiful flowers of all the Cherries. It blooms profusely every year, and holds its blossoms much longer than any other single-flowered Cherry. Unfortunately, it cannot be multiplied by seed, as the seed produces an entirely different plant. The only way to propagate *Prunus subhirtella* is by grafting or by cuttings.

The Sargent Cherry, or as it is now commonly called, *Prunus serrulata sachalinensis,* is one of the most important trees in northern Japan and Saghalin, where it is used for lumber. When it is in flower it is the handsomest of all the large size Cherries. This is one of the most important introductions made by the Arboretum, both as an ornamental tree and as a timber tree. The Cherry plantation in the Arboretum is being extended, and in years to come will doubtless make a show approximating to some extent that which attracts the Japanese by thousands to the Cherry orchards in the Spring. A large number of Cherry trees have also been supplied to Rochester, N. Y., where several acres in the public parks are being devoted to their culture.

Hardly second to the Cherries in beauty are the Crabapples, which are also grouped near the Forest Hills entrance, with a second collection on Peters Hill. These Crabapples make a wonderful burst of bloom in the Spring, and ought to be better known to garden makers everywhere.

Malus floribunda is a tree without a country. That it was sent to Europe from Japan more than sixty years ago is well known, but nobody knows with certainty from what country Japan adopted it. We can only assume that it came from China, like many of the other crabs. In any event, it is wonderfully handsome, never failing to cover itself with masses of beautiful flowers, deep rose in the bud, but turning to white after the petals open. This little tree is far better for home gardens than many of the shrubs commonly used. Professor Sargent calls it one of the handsomest and most desirable small trees which can be grown in the northern United States.

Malus Sargentii is another small crab, the diminutive size of which makes it a good subject for small gardens. It was discovered by Professor Sargent on the borders of a salt marsh in northern Japan. Although rarely growing more than a few feet high, its branches spread out over a space ten or twelve feet in diameter. One attractive feature about this crab is that its fruit remains on the branches until Spring.

Trees raised from seed gathered from plants in a large collection like the one in the Arboretum rarely resemble the parent. While this makes trouble for the botanist, it has a distinct advantage for

the gardener, often resulting in the development of beautiful new forms, which come spontaneously. Such a natural hybrid is *Malus Arnoldiana*. It appeared a few years ago among the seedlings of *floribunda*, and promises to be a welcome addition to our gardens. Many persons consider this to be the handsomest of all ornamental crabs. Its flowers and fruit are twice as large as those of *Malus floribunda*.

Some of the Pear trees are almost as attractive as the crabs. *Pyrus Calleryana* is not among the handsomest and the fruit is of no value. It is believed, though, that this tree offers special advantages to American pomologists, who are seeking a stock resistant to blight on which to graft garden Pears. Pear trees are natives of Europe, China, and the Himalayas. There are no native American Pears. Some of the Chinese species have been growing in the Arboretum since 1882, when Dr. Bretschneider sent seeds there from Peking.

It is when the Lilacs are in bloom that the greatest number of people visit the Arnold Arboretum, probably because of the fame which has been given the Lilac show by the newspapers. Lilacs are used as a border along one side of Bussey Road, not far from the Forest Hills entrance. Many people speak of this section of the road as Lilac Drive. In late May, when the Lilac show is at its height, thousands of people come to the Arboretum to see the magnificent burst of bloom. Altogether, though, there are almost two months in which the Lilacs are in flower in the collection, including nearly every species and variety of the common Lilac alone, with twenty species in addition and several hybrids.

In his various expeditions, Mr. Wilson has discovered a number of extra-fine Lilacs, one of the best being *Syringa Julianae*, a hardy and very shapely shrub, with dark green foliage, and compact clusters of fragrant, pale rose-colored flowers. It is particularly valuable as it blooms later than most true Lilacs. While sweet, it lacks the strong fragrance of *pubescens*, which is the most fragrant of all the Lilacs. In respect to perfume, however, even *pubescens* will soon have a rival, for during the last trip of Mr. Wilson through the far East, he discovered a Lilac in Korea which he says is more fragrant than any which has yet been grown on the American continent. In about five years this statement can be

tested by Boston people, for the seeds brought back by Mr. Wilson should have produced flowering plants by that time.

Syringa villosa is a very handsome Lilac with one point distinctly in its favor. It blooms late, thus prolonging the flowering season of the Lilacs. On the other hand, it has an odor which is distinctly disagreeable. *Villosa* makes a fine, round-topped bush, and if you refrain from sniffing the blossoms, you will find it a splendid acquisition. Look it up next Spring when the Lilacs are in bloom.

A remarkable Lilac known as *Syringa reflexa* grows on the mountains of western Hupeh, in central China, where it was discovered by Mr. Wilson several years ago. It is especially interesting because it is the only Lilac with pendent flower clusters.

There are scores of Lilac varieties in commerce, but trials made at the Arboretum show that the list of kinds suited to the average garden can easily be culled to a dozen. It will be worth the while of any garden maker fond of Lilacs to visit the Arboretum next Spring, when the flowers are in bloom, and note those which please him most. Then, by consulting an Arboretum Bulletin, he can find whether they are suitable for culture in home gardens.

On the south side of Lilac Drive the Viburnums are grouped, and they, too, make a remarkable display over a long season. The Viburnums are highly valuable, because they give us flowers very early in the season, as well as handsome fruit in the Fall. Four American species have been used freely in the roadside plantations of the Arboretum. One of the most satisfactory is *Viburnum cassinoides*, a native New England shrub with a broad, round top, and thick lustrous leaves. The flowers are cream white and the fruit, while pink for a short time, gradually changes color to dark blue. Sometimes green, pink, and blue berries are to be found on the same cluster at the same time.

Another native Viburnum is *pubescens*, which deserves much wider recognition on the part of landscape gardeners than it has yet received. The success achieved by the use of native shrubs of this character in the Arboretum planting indicates the possibilities which our own plants possess as subjects for landscape work on a large scale. *Viburnum pubescens*, especially, grows in limestone soil, yet lime is not necessary for it, and it can be grown over most of the country. This species has small pointed leaves, and

compact clusters of white flowers, followed by shining black fruits. No other Viburnum flowers more profusely. In the collection of Viburnums are many representatives of western Asia. Unfortunately, however, the group does not include the beautiful evergreen species of southern Japan and China, which are not hardy in New England.

The most interesting specimens in the collection are those which belong to the Opulus group, *Viburnum Sargentii* being one of the best representatives. It is hardy, shapely, and the flowers are pure white. When this Viburnum is blooming it is the most beautiful of all its class. Seek it out next June at the side of Bussey Road.

The Azaleas occupy a place of their own on the side of both the Bussey and Hemlock Hills. The most popular collection is on the former elevation, where a large number of the plants are grouped along Azalea path. Few flowers in the Arboretum attract more attention or give greater pleasure. Most gorgeous of all the Azaleas is *Kaempferi*, which was introduced by the Arboretum into the gardens of the United States and Europe in 1893. It was first raised from seed collected by Professor Sargent in Japan. It is perfectly hardy, but the flowers are so delicate, when exposed to the sun, that they soon fade. The greatest beauty of *Azalea Kaempferi* is obtained when the plants are grown in deep or partial shade.

In introducing *Azalea Kaempferi* to New England the Arnold Arboretum has given our gardens a prize not readily excelled. It is a magnificent plant, and in time will be grown in great numbers, as landscape gardeners come to know it better. Moreover, it is just as adaptable to small gardens as to large estates. No one living in Boston should fail to see the Azalea show at the Arboretum.

Another Azalea which makes a wonderful burst of bloom is *poukhanense* which was introduced into the Arboretum by Mr. Jack on the occasion of his trip to Korea some years ago. It was named for Poukhan, a Korean mountain, where it has been found by a French missionary. A beautiful round-topped, compact shrub, with large rosy-pink and fragrant flowers, it seems to be perfectly hardy anywhere in the Arboretum, where it has been flowering for several years. It should prove a good plant for New England gardens, and people who are interested in Rhododendrons

of all kinds would do well to seek it out when it flowers next May. It is to be found on the upper side of Azalea Path.

One of the big floral displays at the Arboretum is made when the Rhododendrons come into flower. The Rhododendron collection borders the road at the base of Hemlock Hill. Unfortunately, a great many people miss it because they go to the Forest Hills or Jamaica Plain entrances, which are a long way off. By leaving the elevated train at Forest Hills and walking up South Street to the South Street entrance, the Rhododendrons are reached in a very few minutes. The Arboretum collection is so extensive, and the plants arranged so skilfully that it offers an unparalleled opportunity to become familiar with the best varieties, as well as with the methods to follow in the culture of Rhododendrons in this climate. There are three native American species and one other, *Rhododendron Smirnowii*, from the Caucasus, which are perfectly hardy, and can be planted with confidence.

Rhododendron album grandiflorum is a white flowered form of a hybrid *catawbiense*. Many hybrids have been produced by crossing *Rhododendron catawbiense* with various Himalayan species, as well as with the native *Rhododendron maximum*. Unhappily, only comparatively few of these hybrids are hardy in this country, even in exceptional positions like that in the Arboretum, where the beds are protected by Hemlock Hill from the sun in March and April.

Of the three native Rhododendrons, *maximum* and *catawbiense* are well known. The third, *carolinianum*, is much less generally cultivated, but it is to be found growing to perfection in the Arboretum. It, too, comes from the Carolina mountains, but has a dwarf habit. Its flowers are grown in profusion, and seldom show any trace of rust. There is every reason to believe that this introduction will fill a long felt want for a hardy dwarf Rhododendron whose flowers have no trace of magenta. It seldom grows more than eight feet high, and has dark green leaves, covered with rusty dots below. The flowers come in June, and are borne in great profusion, fairly smothering the plant in a rose-colored blanket. Incidentally it may be said that this Rhododendron was named by Mr. Rehder of the Arboretum staff.

England is fighting now with the Rose as her national flower. France has her Fleur-de-lis; but the United States has officially no

national flower. If such a flower should be chosen, probably the Mountain Laurel would be the most conspicuous candidate for the honor. The Mountain Laurel is not found in any other land, but it is very widespread in America. There is a big collection in the Arboretum, near the South Street entrance, at the base of Hemlock Hill. The flowering of the Laurels is the last of the great Arboretum flower shows of the year, and none of those which precede it are more beautiful, for the Mountain Laurel, or the Calico Bush as it is often called, is in the judgment of many flower-lovers the most beautiful of all North American shrubs or small trees.

This great Laurel show in the Arnold Arboretum did not happen all at once. Jackson Dawson, the wonderful gardener who helped during all his life to make the world more beautiful, selected many of these Laurel plants in the mountains of Connecticut, Massachusetts, and New York.

Not far from the Rhododendrons and Laurels is a collection of Yews, which excite much attention. The Japanese Yew, *Taxus cuspidata*, is considered by Professor Sargent to be the most generally valuable plant which the northern United States has obtained from Japan. Its native home is in the forest of northern Japan, where it becomes a tree forty or fifty feet high. It has not grown as tall as in its native country, but is perfectly hardy, and never suffers in the coldest winter. It is an excellent hedge plant, too, and can be used advantageously in the decoration of formal gardens.

Another very interesting Japanese tree is *Acanthopanax ricinifolium*. As it grows at the side of a little pond not far from the Forest Hills Entrance, it makes an unusually attractive appearance. This tree belongs to the Aralia family, and the large, drooping leaves resemble in shape those of the Castor Oil Bean. The small, white flowers, which are produced in broad, flat clusters, do not appear until the middle of August, and are followed by small, black, shining fruit. People who want to cultivate a perfectly hardy tree, unlike any tree which is a native of North America or Europe, will find this Acanthopanax highly satisfactory.

Among the dwarfer Japanese plants the Junipers are especially interesting. They are to be found on the north side of Bussey Hill. The *Juniperus chinensis*, var. *Sargentii*, is the handsomest of the

dwarf Junipers which can be grown successfully in this climate. This shrub was named for Professor Sargent because he was the first man to collect it, finding the seeds in southern Hokkaido, in 1892. The plants raised from the seed which he brought home are probably the only ones in cultivation. It can be seen to advantage on the Hemlock Hill road, opposite the Laurels, where there are several large plants.

Several other Junipers are to be found in the Arboretum collection, and are of particular interest to landscape gardeners. Some of the more prostrate forms are highly valuable for covering banks and the margin of ponds. *Juniperus horizontalis* is an especially good garden plant, and *Juniperus procumbens*, a Japanese species, is being planted largely in California. It is perfectly hardy in the Arboretum, and may be grown as well here as in the west.

Eucommia ulmoides is the so-called hardy Rubber-tree and one of the most interesting of Chinese plants. The leaves contain a small amount of rubber, as can be seen by pulling a leaf apart. It has no economic value but Eucommia is a good ornamental tree for the northern states on account of its thick, dark green, shining leaves and good habit. It is well established in the Arboretum where it has flowered.

The plantation of young Cedars of Lebanon is the result of an experiment in naturalization undertaken by the Arboretum. The Cedar of Lebanon grows on the Lebanon Range in Syria, and also on the Anti-Taurus Mountains in Asia Minor, a more northern and much colder region. In its southern form it is not hardy in Massachusetts and an effort to secure a hardy race of this important and interesting tree led the Arboretum several years ago to have seeds gathered at the northern limits of its range in Asia Minor. Plants raised from these seeds have been growing in the Arboretum for fifteen years in exposed, windswept positions, and have not been injured by the exceptional cold of several winters. The seedlings of no other conifer raised in the Arboretum have grown so rapidly, the largest of these plants having attained the height of twenty-two feet in twelve years from the time the seed was planted.

As had been said, the Arnold Arboretum is really a museum of trees, the greatest institution of the sort in the world. It is fitting,

therefore, that the native trees should have a very large representation. They have been grouped for easy study, and can be found with but little difficulty. Among the handsomest are the Oaks, and they are particularly beautiful in the Arboretum, because allowed to grow in a natural way. The Red Oak rears its huge trunk from a bed of wild Asters, a natural forest floor in the Arboretum grounds.

Among the most interesting of the deciduous trees are the Maples, a large collection of which may be found near the shrub garden. It includes both native and foreign species. The fastigiate Sugar Maple, *Acer saccharum*, var. *columnare*, is of particular interest to landscape gardeners, as it can be used as a substitute for the more short lived Lombardy Poplar. It is quite as pyramidal in form, and handsomer in foliage, but of course does not grow nearly so rapidly. This column-like Maple was first discovered in a Newton cemetery, and whatever trees of the type exist at the present time have come from this parent.

Many visitors to the Arboretum find the pinetum the most interesting feature of all. The pinetum is close to the Walter Street gate. Among the notable trees to be found there is the Carolina Hemlock, a native of the Blue Ridge, where it forms extensive forests on high mountain slopes. It is one of the most beautiful of the coniferous trees that are hardy and that can be successfully grown in the northern states. The Carolina Hemlock was first raised in the Arboretum more than thirty years ago. Judging from the behavior of the tree, it may be placed among the six most desirable conifers that can be planted in southern New England, the others being the White Pine, the Red Pine, the Northern Hemlock, the White Fir of Colorado, and the Japanese *Abies brachyphylla*.

The last named fir, which is also called *Abies homolepis*, is one of the handsomest and most satisfactory of all the conifers which Japan has sent to this country. It has dark green leaves, which are silvery-white on the lower surface, and its cones are rather unusual in color, being a violet purple. There is a tree in the Hunnewell pinetum fifty-five feet high, with branches which sweep the ground, and illustrate the beauty of the mature specimen. The Arboretum trees are smaller, but already are producing their handsome cones.

Many coniferous trees have produced abnormal forms, that is, individuals with abnormally erect or pendent branches, or with short branches which grow so slowly that they form little round-topped bushes often not more than two feet high. All such plants are interesting, some of them are beautiful. They have always been favorites with nurserymen, and an unusually large collection is cultivated in the Arboretum. A form of the White Pine, with erect growing branches is called *Pinus strobus fastigiata.* The tree from which the plants in the Arboretum were propagated was found in the woods of Massachusetts many years ago by Jackson Dawson. This pine is considered the handsomest of the conifers with erect-growing branches which can be grown in the northern states.

In the Arboretum are weeping forms of the common Red Cedar, *Juniperus virginiana,* with pendulous branches. Of the numerous seedling forms of the Red Cedar this is one of the most distinct. It is also one of the handsomest of the hardy conifers with pendulous branches.

The so-called Weeping Hemlock, *Tsuga canadensis pendula,* is often called the Sargent Hemlock in honor of the late Henry Winthrop Sargent of Fishkill Landing (now Beacon) New York, who in his time had one of the largest collections of conifers in America.

The beauty of the Arboretum does not pass with the passing of Summer. On the contrary, the Fall display of fruits, berries, and brilliant foliage is almost as fine as that made by the flowers in the Spring. *Evonymus Bungeanus* is a native of northern China, and is a small tree with slightly pendulous branches. When Fall comes, its narrow leaves turn a clear bright yellow. The greatest beauty of this plant, though, lies in its fruit, which is pink and very abundant. The fruit is held for several weeks after the leaves fall, and makes a glorious display along the Meadow Road, worth twenty minutes of any man's time to visit. Nowhere else in all the world can so many different plants with brilliant Autumn foliage and handsome Fall fruits be found in one collection. Likewise there is no other garden in all the world where these plants can be so easily and conveniently studied.

Every garden maker by rights should plant with the idea of keeping his garden gay with color practically the year round. As

Bacon puts it: "I do hold it in the Royall Ordering of Gardens that there ought to be gardens for all the months of the year; in which severally things of beauty may be there in season." One of the good plants to use is *Ligustrum vulgare foliosum.* This is a form of the common European Privet, but differs from it in having narrow leaves and larger fruit. It holds its leaves without a change of color until the beginning of Winter, which makes it a good subject for garden decoration. Its black berries are borne in great profusion and in large clusters which add to its ornamental value.

Even though the leaves may fall and the berries be eaten by the birds, it is still possible to have plenty of color in the garden by planting shrubs which possess red and yellow stems, particularly the Dogwoods of different kinds. In a corner of the Meadow Road in the Arboretum a handsome collection of American Cornels may be found. Here we see *Cornus stolonifera* with red stems, and its variety *flaviramea* with yellows tems. These plants, with *Kerria japonica* to provide rich green stems, are splendid for any garden.

Even when the ground is blanketed with snow there is much of interest and beauty within the Arboretum gates. It is then that the Conifers, always delightful, show up to the best advantage. Scores of trees and shrubs carry their gaily colored fruit well into Winter. Some of the Hawthorns, of which there are several groups, keep their berries until Spring, and so do the Barberries. As a matter of fact it has been found from actual observation in the Arboretum that it is possible in this climate to have flowers every month in the year except possibly December. The foreign Witch Hazels begin to flower in late Winter, and last through until March, when some of the Willows burst into bloom.

Perhaps all this will give you at least a meager conception of the great work which the Arboretum is doing, the great task to which it has set its hand, and what it offers to the public as well as to specialists and nurserymen.

The Arnold Arboretum is a great living museum of trees and shrubs. It is more than that. It is a wonderful example of landscape gardening, one of the best in the world. Its influence upon American horticulture is incalculable, and this influence must necessarily go on growing, as long, may we hope, as the Arboretum lasts, that is to say, for a thousand years and then another thousand years, and so on forever.

NEW HORTICULTURAL CROPS FOR OUR SCANT FOOD SUPPLY.[1]

By Prof. U. P. Hedrick, Geneva, N. Y.

Delivered before the Society, February 2, 1918.

Economists prophesy a deficiency in the world's food supply. The cost of living everywhere portends accuracy in their divination. The fast and furious struggle between nations and individuals for land upon which to grow food augurs lean years to come. Census enumerations of population presage sooner or later a dearth of ammunition among the multiplying peoples of the earth to carry on the battle of life. Of all this you need to be reminded rather than informed.

So many men have stated and attempted to solve the problem of the future food supply that it would seem that the subject has been wholly talked out from the facts at hand. Indeed, there has been so much said and written about hard times at hand and famine ahead that I doubt if you are pleased to have your premonitions reawakened by further forebodings.

Agricultural economists discuss three rather general means of securing a food supply for those who live later when the earth teems with human beings. These are: conservation of resources; greater acreages under cultivation; and increased yields from improved plants and through better tillage. It is difficult to anticipate the problems that will confront us when people swarm on the land, as now in India or China, but I venture the prediction that if in that day "the evil arrows of famine" are sent upon us, a fourth means of supplying food will be found quite as important as the three named.

We shall find, long before famine overtakes us, that the natural

[1] This address was originally a presidential address before the Society for Horticultural Science and was printed in the report of the Society for 1913. It was given before the war and its revision and repetition seems to the writer justified by the world-wide shortage of food brought about by the war.

capacity of soils and climates to produce a diversity of crops is one of the greatest resources for an increased food supply. As yet, multiplicity of crops as a means of augmenting the supply of food has received little attention and I want to bring you to a better realization of its possibilities in the half hour at my disposal, attempting to show, in particular, how greatly the necessities and luxuries of life can be increased by the domestication of wild esculents; by better distribution of little-known food plants; and by the amelioration of crops we now grow through breeding them with wild or little-known relatives.

Few, even among those who have given special attention to agricultural crops, have a proper conception of the number that might be grown. De Candolle, one of the few men of science who have made a systematic study of domesticated plants, and whose "Origin of Cultivated Plants" has long been sanctioned by science as authoritative, is much to blame for the current misconception as to the number of plants under cultivation. By conveying the idea that his book covers the whole field, De Candolle prepared the ground for a fine crop of misunderstandings. Humboldt stated in 1807 that, "The origin, the first home of the plants most useful to man, and which have accompanied him from the remotest epochs, is a secret as impenetrable as the dwelling of all our domesticated animals."

De Candolle set out to disprove Humboldt. He assorted cultivated plants in 247 species and ascertained very accurately the histories of 244 out of the total number. De Candolle's thoroughness, patience, judgment, affluence of knowledge, clear logic and felicity of expression, make his book so trustworthy and valuable in most particulars, that we have accepted it as the final word in all particulars, overlooking his faulty enumeration and forgetting that most of his material was gathered more than a half century ago.

My first task is to establish the fact that the number of plants now cultivated for food the world over is not appreciated in either science or practice. Neither are botanists nor agriculturists seemingly well aware of the number of edible plants now domesticated which are in times of stress used in various parts of the world for food, many of which can well be grown for food. Your attention must be called to the number of these.

Inspiration for this discussion of the undeveloped food resources of the plant-kingdom came to the speaker from the use of notes left at the New York Agricultural Experiment Station by the first director of the station, the late Dr. E. Lewis Sturtevant, during his active life a member of this Society, who gave much time to the study of economic botany. His pen contributions on cultivated plants in agricultural and botanical magazines cover thirty years and number many titles. In addition, the unpublished material just mentioned, under the heading "Edible Plants of the World" takes up over 1,600 typewritten pages. During his life, Dr. Sturtevant was in the full tide of American science, but I am sure could he have lived to publish the great treatise which he had planned on edible plants, and upon which he worked for twenty years, we should give him much higher rank with giants of science, and that his book would now be the *magnum opus* of economic botany.

De Candolle, as we have seen, includes but 247 cultivated species in his work. This is approximately the number generally thought to minister to the alimentary wants of man. Sturtevant, in his notes on edible plants, enumerates 1,113 domesticated species now cultivated, and a total of 4,447 species, some part or parts of which are edible. Following De Candolle, Sturtevant made use of botany, archeology, paleontology, history and philology in obtaining his data. He searched the literature of the world from the earliest records in Egyptian, Chinese and Phoenician until the time of his death to make a complete record of the edible plants of the world. Sturtevant's were the species, too, of a generation ago, many of which have since been divided twice, thrice, or oftener by later botanists. It is said that no food plant of established field culture has ever gone out of cultivation, an approximate truth, at least, from which we may presume that the number of cultivated plants is not smaller than the numbers given from our author's notes.

In leaving this phase of my subject, I can not but say, despite the fulness of Sturtevant's notes, the feeling comes in reading them, as it does in reading De Candolle, Darwin or whoever has written on the domestication of plants, that what has so far been found out is so little in comparison to what we ought to know regarding the modification of cultivated plants by man, that our present knowledge but makes more apparent the dire poverty of our information.

Passing now to a more direct discussion of the subject in hand, I have to say that I have chosen to discuss three general means of developing the latent possibilities in the plant-kingdom for agriculture. It may help to hold your attention if I discuss these in order of their importance — the most important last. They are: First, the domestication of the native plants of any region. Second, better distribution of plants now cultivated. Third, the utilization of hybridization to bring into being new types of plants better suited to cultivation and to the uses of man.

In the matter of domesticating plants let us glance hastily at what has and what can be done in our own country. In De Candolle's treatise we make but a poor showing, indeed. Out of his 247 cultivated species but 45 are accredited to the New World, and but three of these — the pumpkin, Jerusalem artichoke and persimmon — come from North America. To these three, Sturtevant adds about thirty. The poor showing made by our continent in furnishing food plants, it must be made plain, is not due to original inferiority. The number would be vastly greater, as Asa Gray long ago pointed out, had civilization begun in this rather than in the Old World. It is probable, indeed, that the numbers would be approximately equal if civilization had begun as early in the Western as in the Eastern Hemisphere.

What are some of these plants that Gray and other botanists have so often told us might have been and may yet profitably be domesticated? The list is far too long to catalogue, but you will permit me time for a few examples, choosing those that are still worth domesticating for some special purpose or environment. Fruits give us most examples.

Wild fruits abound in North America. The continent is a natural orchard. More than 200 species of tree, bush, vine and small fruits were commonly used by the aborigines for food, not counting nuts, those occasionally used, and numerous rarities. In its plums, grapes, raspberries, blackberries, dewberries, cranberries and gooseberries North America has already given the world a great variety of new fruits. There are now under cultivation 11 American species of plums, of which there are 433 pure-bred and 155 hybrid varieties; 15 species of American grapes with 404 pure and 790 hybrid varieties; 4 species of raspberries with 280

varieties; 6 species of blackberries with 86 varieties; 5 species of dewberries with 23 varieties; 2 species of cranberries with 60 varieties and 2 gooseberries with 35 varieties. Here are 45 species of American fruits with 2,226 varieties, domesticated within approximately a half century. De Candolle named none of them. The final note of exultation at this really magnificent achievement of American horticulture would typically be uttered in a boast as to the number of millions of dollars these fruits bring fruit-growers each year, but science is not sordid and has not made the calculation.

What more can be done? The possibilities of the fruits named have by no means been exhausted. The fruit of the wild plum, *Prunus maritima*, an inhabitant of sea-beaches and dunes from Maine to the Carolinas, is a common article of trade in the region in which it grows, but notwithstanding the fact that it readily breaks into innumerable forms and is a most promising subject under hybridization, practically nothing has yet been done toward domesticating it. Few plants grow under such varied conditions as our wild grapes. Not all have been brought under subjugation, though nearly all have horticultural possibilities. It is certain that some grape can be grown in every agricultural region of the United States. The blueberry and huckleberry, finest of fruits, and now the most valuable American wild fruits, the crops bringing several millions of dollars annually, are not yet domesticated. Coville has demonstrated that the blueberry can be cultivated. Some time we should have numerous varieties of the several blueberries and huckleberries to enrich pine plains, mountain tracts, swamps and waste lands that otherwise are all but worthless. A score or more native species of gooseberries and currants can be domesticated and should some time extend the culture of these fruits from the Gulf of Mexico to the Arctic Circle. There are many forms of juneberries widely distributed in the United States and Canada, from which several varieties are now cultivated. The elderberry is represented by a dozen or more cultivated varieties, one of which, brought to my attention the past season, produced a half hundred enormous clusters, a single cluster being made up of 2,208 berries, each a third of an inch in diameter.

These are but a few of the fruits — others which can only be

named are: the anonas and their kin from Florida; the native crabapples and thorn-apples; the wine-berry, the buffalo-berry and several wild cherries; the cloud-berry prized in Labrador; the crow-berry of cold and Arctic America; the high-bush cranberry; native mulberries; opuntias and other cacti for the deserts; the paw-paw, the persimmon, and the well-known and much-used salal and salmon berries of the west and north.

The pecan, the chestnut and the hickory-nut are the only native nuts domesticated, but some time forest and waste places can be planted not only to the nuts named, but to improved varieties of acorns, beechnuts, butternuts, filberts, hazels, chinquapins and nutpines, to utilize waste lands, to diversify diet and to furnish articles of food that can be shipped long distances and be kept from year to year. The fad of today which substitutes nuts for meat may become a necessity tomorrow. Meanwhile it is interesting to note that the pecan has become within a few decades so important a crop that optimistic growers predict in another half century that pecan groves will be second only to the cottonfields in the south. A bulletin from the United States Department of Agriculture describes 67 varieties, of which more than a million and a half trees have been planted.

It is doubtful whether we are to change general agriculture much by the domestication at this late date of new native grains, though many may well be introduced from other regions and wonderful improvement through plant-breeding is, as all know, now taking place. Raw material exists in America for domestication, but it is not probable that we shall ever use it extensively.

There are, however, a number of native vegetables worth cultivating. The native beans and teparies in the semi-arid and subtropical southwest to which Freeman, of the Arizona station, has called attention, grown perhaps for thousands of years by the aborigines, seem likely to prove timely crops for the dry-farmers of the southwest. Professor Freeman has isolated 70 distinct types of these beans and teparies, suggesting that many horticultural sorts may be developed from his foundation stock. The ground-nut, *Apios tuberosa*, furnished food for the French at Port Royal in 1613 and the Pilgrims at Plymouth in 1620, and as a crop for forests might again be used. There are a score or more species

of *Physalis*, or ground cherries, native to North America, several of which are promising vegetables and have been more or less used by pioneers. *Solanum nigrum*, the nightshade, a cosmopolite of America and Europe, recently much advertised under several misleading names, and its congener, *Solanum triflorum*, both really wild tomatoes, are worthy of cultivation and in fact are readily yielding to improvement. *Amaranthus retroflexus*, one of the common pigweeds of gardens, according to Watson, is cultivated for its seeds by the Arizona Indians. In China and Japan the corms or tubers of a species of *Sagittaria* are commonly sold for food. There are several American species, one of which at least was used wherever found by the Indians, and under the name arrowhead, swan potato and swamp potato has given welcome sustenance to pioneers. Our native lotus, a species of *Nelumbo*, was much prized by the aborigines, seeds, roots and stalks being eaten. *Sagittaria* and *Nelumbo* furnish starting points for valuable food plants for countless numbers of acres of water-covered marshes when the need to utilize these now waste places becomes pressing.

The temptation is strong to continue this discussion of the domestication of native plants, but time demands that I pass to a consideration of the second potential of an increased diet, that of better distribution of the world's food-producing plants.

Beginning with the discovery of the New World, botanical and agricultural explorations have been carried on with zeal, and food plants have been interchanged freely between newly discovered lands and older civilizations. Yet in these centuries the food-plant floras of races have been changed but little. Quite too often a crop is found to be the monopoly of a race or nation irrespective of soil and climate, factors which ought to import a cultivated flora. It would seem that agriculturists would quickly adopt food plants grown elsewhere of which the advantage is evident, and be thereby diverted from the cultivation of poorer crops in their own country. Yet the introduction of foreign plants is usually arrested, if not actually opposed by the timidity of agriculture, and it has been most difficult to introduce new crops into old regions. This conservation on the part of those who grow the food plants of the country is due to a universal dislike in the animal kingdom, most strongly developed in the human family, to eating unfamiliar foods.

But travel is making all people less and less fastidious as to foods, as the numerous new foreign dishes in daily use in our own homes give evidence. Only savages and those who must struggle for sufficient food to sustain life line on one or a few foods.

Let us hastily run over a few foreign plants that may well receive more attention in America, naming fruits first as of most interest to this audience. Japanese plums and persimmons came to America in the medieval days of horticultural progress, and interest in them seems to have ceased. We need new importations of the many types not yet in the country. The fig is an ancient immigrant, but many desirable relatives were left behind. Date culture is now a most promising infant industry in the southwest. The Chinese jujube promises to be one of the most valuable of the many plants recently introduced into this country. The jujube is a hardy tree which has been cultivated in China for more than 4,000 years, being one of the five principal fruits of the new republic. There are hundreds of varieties differing in flavor and sizes, some growing less than an inch in length and others equaling the size of a hen's egg. One variety is seedless. Some kinds are eaten fresh, some are stewed.

Among the newest of the new on probation, but all clamoring for recognition, are the avocada from tropical America; the feijoa from Brazil; a dozen or more annonaceous fruits from the tropics, of which the cherimoya seems now to be most prominent; an edible Osage orange from Central China; the roselle, an annual from the Old World tropics, valuable for its fruit, stalks and seed. Several species of *Berberis* supply a refreshing fruit in northern Asia and might add variety to the rather spare fruit diet of the colder parts of this continent. Beside these are innumerable new citrus fruits, the number of species and varieties of which seem to be legion — the speaker is neither able to enumerate them not to tell where they begin or where they leave off. Swingle's splendid work with this genus is one of the most notable contributions to horticulture in recent years.

The mango has long been grown in Florida, but interest in mangos has recently been renewed through the introduction of choice Indian varieties. Poponoe describes 312 varieties of mangos grown in various parts of the world, of which as yet I judge there

are but few in America, though they are not difficult to grow in Florida, California or in our insular possessions. A quotation from Fairchild suggests the possible future of the mango in America. He says:

"The mango is one of the really great fruits of the world.... There are probably more varieties of mangos than there are of peaches. I have heard of one collection of five hundred different sorts in India. There are exquisitely flavored varieties no larger than a plum, and there are delicious sorts, the fruits of which are six pounds in weight. These fine varieties, practically as free from fiber as a freestone peach, can be eaten with a spoon as easily as a canteloupe. Trainloads of these are shipped from the mango-growing centers of India and distributed in the densely peopled cities of that great semi-tropical empire."

No one can read Bayard Taylor's fervent praise of the durian and the mangosteen and not desire to grow these fruits in America.

He says of the durian: — "Of all fruits, at first the most intolerable; but said, by those who have smothered their prejudices, to be of all fruits, at last, the most indispensable. When it is brought to you at first, you clamor till it is removed; if there are durians in the next room to you, you can not sleep. Chloride of lime and disinfectants seem to be its necessary remedy. To eat it seems to be a sacrifice of self-respect; but, endure it for a while, with closed nostrils, taste it once or twice, and you will cry for durians thenceforth, even — I blush to write it — even before the glorious mangosteen."

Listen to his laudation of the "glorious mangosteen."

"Beautiful to sight, smell and taste, it hangs among its glossy leaves the prince of fruits. Cut through the shaded green and purple of the rind, and lift the upper half as if it were the cover of a dish, and the pulp of half-transparent, creamy whiteness stands in segments like an orange, but rimmed with darkest crimson where the rind was cut. It looks too beautiful to eat; but how the rarest, sweetest essence of the tropics seems to dwell in it as it melts to your delightful taste."

One need not titillate the palate to enjoy such fruit. Can they be so delectable? Surely we can find a place for them somewhere in America.

Let us turn to a few examples of promising vegetable and farm crops of foreign countries not yet cultivated in the United States. Only those which give most emphasis to the present paper can be mentioned.

All know that rice furnishes the chief food of China, but few are aware that sorghum is as important a crop in Asia as rice and that it is the chief food of a large part of Africa. In China not only are the stalks of sorghum used, but bread is made from the seeds. In parts of India, sorghum is the staff of life. The Zulu Kaffirs live on the stalks, which are chewed and sucked, and Livingstone says, "the people grow fat thereon." The several species of yams constitute one of the cheapest and most widely distributed food plants in the world, yet the yam is little grown in America. Several genera of Aroideae, as *Caladium*, *Alocasia*, *Colocasia*, and *Arum*, each with innumerable varieties, furnish taro, arrowroot, ape and other more or less familiar food to the South Sea islanders. In a bulletin from the United States Department of Agriculture, under the title, "Promising Root Crops for the South," these Aroids, called under their native names of yautias, taros, and dasheens are recommended as most valuable wet-land root crops for the South Atlantic and Gulf States. Of the place of the cocoanut in the world's economy I need not speak. Varieties of Maranta were grown in Mississippi and Georgia in 1849, but disappeared. From one of the several species of this genus comes the arrowroot of commerce. Arrowroot is a favorite food of the Fijis and their neighbors, as well as of the inhabitants of Cape Colony, Natal, and Queensland. May not arrowroot some time be produced profitably in America? The banana has been on our tables less than a generation, yet it is now one of the commonest foods. There are several species and many varieties yet to be introduced into the tropics of America. The leaves and buds of several agaves furnish an abundant and a very palatable food to our southern neighbors. From plants of the large genus *Manihot* of equatorial regions, tapioca is made under conditions which could be greatly improved. As cassava, one of these manihots is already important in the United States and may some time compete with corn and wheat in the food supply of the country.

To quench the thirst of the teeming millions in time to come

there may be a multiplicity of beverages as well as of foods to mitigate hunger. In Arabia several millions of people drink khat, while in southern South America as many more millions allay their thirst with maté. Maté, according to Fairchild, can be produced at but a fraction of the cost of tea and supplies the same alkaloid in a more easily soluble form. Both contain thein, the active principle in "the cups that cheer but not inebriate." Sturtevant names twelve plants the leaves of which are used in different parts of the world to adulterate or in place of tea. We have but just acquired the use of cocoa and chocolate from the natives of our American tropics and of cocacola from the negroes of Africa, and it is not unlikely that we shall find other similar stimulants. For drinkers of more ardent beverages, if King Alcohol continues to reign, there is an abundance, the diversity and cheapness of which probably will ever as now be regulated by taste and taxes.

Time prevents my naming other valuable foreign plants that deserve to be tried in our agriculture. It is fortunate for American farming that men from the United States Department of Agriculture are now searching everywhere for new material. Saul went in search of asses and came back with a crown. So these men sent to foreign countries for material, possibly commonplace enough, are bringing back treasures the value of which in many cases will be incalculable. Introduction of seeds and plants for the nation is work to which the institutions represented here should lend aid in every way possible.

The last of the three means of developing plants for food, and as I believe the most important, is by using either foreign species or wild native species to hybridize with established crop-plants. It needs but a brief statement of what has been accomplished in increasing hardiness, productiveness, disease resistance, adaptability to soil, and other essentials of standard crop-plants, to show that through hybridization of related species we have probably the best means of augmenting our diet. Let us glance at a few recent accomplishments of hybridization, noting chiefly results with horticultural plants.

Downing in 1872 described 286 varieties of 4 species of plums. In the 40 years that have elapsed the number has increased to 1,937 varieties representing 16 species. Now the significant thing

is that whereas Downing's plums were pure-bred species, 155 of the present cultivated plum flora are hybrids between species. Downing could recommend plums for only a few favored regions. Some kind of plum can be grown now in every agricultural region in North America. Even more remarkable is the part hybrids have played in the evolution of American grapes. At the beginning of the nineteenth century, the grape could not be called a cultivated crop on this continent. Now there are 16 species and 1,194 varieties, the most significant fact being that 790 or three-fourths of the total number are hybrids. The grape through hybridization has become one of the commonest cultivated plants. The genus *Rubus* promises to attract and distract horticulturists next. As nearly as I can make out there are about 60 species of *Rubus* in North America. In the two completed parts of Focke's "*Species Ruborum*," 273 species are described. Raspberries, blackberries, dewberries and their like hybridize freely and we already have in the loganberry, the purple-cane raspberry, the wineberry and in the blackberry-dewberry crosses valuable fruits. If any considerable number of Focke's several hundred species can be similarly mixed and amalgamated, the genus *Rubus* will be one of the most valuable groups of fruits.

The speaker a few years ago made a study of cultivated cherries. When the work began a few years ago about a score of species were in sight. Koehne, a recent botanical monographer of the subgenus *Cerasus*, to which our edible cherries belong, describes 119 species, many of them but recently collected by Wilson in Asia. There are enough hybrids between species to indicate that cultivated cherries will some time be diversified as plums and with quite as much advantage to the fruit.

Webber's and Swingle's work in breeding hardy citrus fruits; blight-resisting pears as a result of crossing *Pyrus communis* and *Pyrus sinensis*; Burbank's spectacular hybrid creations; the diversity of types of tomatoes, potatoes, egg-plant, peppers, beans, cucurbits and other vegetables, not to mention roses, chrysanthemums, orchids and innumerable flowers, suggest the possibilities of hybridization. We have not done what lies within our reach in crossing cereals — corn, wheat, oats, rye, buckwheat, the last especially, remain yet to be touched by the magic wand of hybridi-

zation. Hybrid walnuts, chestnuts, hickories, and oaks, promise a wonderful improvement in nuts.

Truth is we do not know how much nor what material we have to work with in many of the groups of plants I have named, lending color to the saying that the plants with which man has most to do and which render him greatest service are those which botanists know least. This brings me to the last division of my subject.

Nothing is more certain than that we are at the beginning of a most fertile period in the introduction of new and the improvement of old food-plants. Yet agricultural institutions are most illy prepared to take part in the movement. "Art is long and time is fleeting," can be said of no human effort more truly than of the improvement of plants, and haste should be made for better preparation. Looking over the material that is usable in agricultural institutions, it seems that we are sadly lacking in the wherewithal upon which to begin. It is indispensable for effective work that we have an abundance of material and that we know well the plants with which we are to work.

How may the material be had? We are fortunate in the United States in having the Office of Foreign Seed and Plant Introduction of the United States Department of Agriculture for the importation of foreign plants. This office has effective machinery for the work. It maintains agricultural explorers in foreign countries. It is in direct contact with the agricultural institutions of other countries as well as with plant-collectors, explorers, consuls, officers of other countries, and missionaries. Through these agents it can reach the uttermost parts of the world. Morevoer, it has trained men to identify, to inventory, to propagate and to distribute foreign plants. This office can better meet quarantine regulations than can private experimenters or state institutions. All interested in foreign plants ought to work in cooperation with the Office of Foreign Seed and Plant Introduction of the Department of Agriculture.

To be used advantageously material must be near at hand. This means that there must be botanic gardens. There should be in every distinct agricultural region of the country a garden where may be found the food plants of the world suitable for the region. It is strange that in the lavish expenditure of state and federal

money in the agricultural institutions of the land, that so little has been done to establish and maintain comprehensive plantations of economic plants. Now that the amelioration of plants is a part of the work of agricultural colleges and stations it would seem that the establishment of such gardens is imperative. True, there are botanic gardens, but the museum idea is dominant in most of them — they contain the curiosities of the vegetable kingdom, or they show the ornamental and beautiful, or they are used for purposes of instruction. We need agricultural gardens in which agricultural plants are dominant rather than recessive.

There is another difficulty quite as detrimental to progress as inability to obtain material. It is the lack of trustworthy information in regard to economic plants. Quite as necessary as agricultural gardens is an agricultural botany. In this botany must be set forth, besides descriptions of species, the habitat, the migrations, the geographical relations to other plants, the changes that have occurred, how the plant is affected by man-given environment, and all similar data. Physiological facts regarding germination, leafing, flowering and fruiting must be given. The production of such a book is a consummation devoutly to be wished.

Lastly, material and books do not create. The man has not been lost sight of, but I should have to set forth his temper and training too hurriedly even if I could properly conceive them. But from the beginning to the end of this new shaping of food crops, the individual man trained for the work will be dominant. The work to be done, however, is so vast that we can not make an appreciable showing unless the task be divided among a great number of workers. Those who will do most are such as can concentrate on particular problems the sifted experience and knowledge of the world. Many may sow, but only the strong can garner.

In conclusion, I must end as I began by calling attention to the great probability of a near-at-hand deficiency of food. I must again urge the importance of making use of every means of increasing the supply. I have tried to call attention to the desirability of growing a greater number of food-plants as one of the means. Not to attempt to develop and utilize to its highest efficiency the vast wealth of material in the plant-kingdom for the world's food is improvidence and is a reckless ignoring of splendid opportunities to increase the number of food-crops and thereby the world's food supply.

THE PEONY.

By Bertrand H. Farr, Wyomissing, Pa.

Delivered before the Society, with stereopticon illustrations, February 16, 1918.

I remember the first Peony I ever saw. It was the first year when father took us west, and I was six years old. It grew in my aunt's garden. It wasn't a real Peony, it was just a "Piney," one of those old-fashioned red ones that grew in all old ladies' gardens, but I thought it was very beautiful. I told her if she would give me a bloom, I would drive her cow home from the pasture that night. The arrangement was mutually satisfactory, and after further negotiations she agreed that if I would drive the cow home for one week, she would give me a "Piney toe," and so I came into possession of my first Peony.

More than 25 years elapsed before I owned another Peony, but when in 1897 I came to Wyomissing, where I could have a real garden, one of the first things I determined was to have a complete collection of Peonies, "a white one, a red one and a pink one." Then I discovered that Ellwanger & Barry had a great collection as many as twenty kinds. After I had gotten these, one of Lemoine's catalogues fell into my hands and, after some hesitation over the extravagance, I made the plunge. I sent to him my first foreign order in 1901. Only then did I realize what was before me, but it was too late. The Peony bug had gotten me, as it has gotten many others, and will get you too if it once gets fairly hold of you. Orders from Dessert and others soon followed. Then from Kelway in England.

There must have been a sort of Peony epidemic prevalent at that time, for I learned afterwards that a number of those who today are well known in the Peony world, were similarly affected at about the same time in the same manner, the two Petersons, Shaylor, McKissock, Ward, John Good, Betcher and others. In the Thur-

low ranks, where it had partly subsided (Mr. Thurlow having recently sold his collection), there was a fresh outbreak of the craze. I was not then in touch with these people, but I had heard of a Peony Society. I came home, packed my grip and started to Boston to see the Peony Show, and learn something about Peonies.

Ever since then Boston has seemed to me the "Hub" in Peony matters, as it used to be for me in things musical, for here in this hall I got my first real inspiration. I stopped off at Cottage Gardens to see Mr. Ward, President of the Peony Society. He was busy collecting flowers for the show, noting new things coming into bloom for the first time, identifying things untrue, etc., and trying his best to be polite to me, all at once. In the light of later experience, I can appreciate his position, but neither he nor I suspected then that I was to be his successor.

I have brought with me a photograph of that Peony Show in 1906, that I took myself. Over on one table is a display of Hollis' new seedlings. Several of them, Paradise, Goliath, Bunker Hill, and Welcome Guest received certificates of merit. He also showed a fine lot of Japanese types, then little thought of, but since these have become very popular. Among these especially were Glory, Bobby Bee, and Attraction. Mr. Shaylor carried off the honors, as he has done so many times since, with his splendid collection. Mr. McKissock was there with his fine collection of novelties from France. Of course the Thurlows were represented there, and in the center of the room stood a massive great vase of Richardson's Rubra Superba, which carried off the first prize. Here I first met the Rev. C. S. Harrison, "Evangelist of the Peony," for he, more than anyone else has preached the gospel of the Peony throughout the great northwest. Here I met our Mr. Fewkes, whom all of us of the Peony Society have come to hold in such sincere regard. I visited T. C. Thurlow, the first of the great Peony enthusiasts in New England, at his delightful and hospitable home. I visited James McKissock, and his beautiful collection at West Newton.

Up at Wellesley Hills I found Mr. Shaylor among his Peonies. In one corner, carefully screened under a tent from the hot sun, we came to the climax of our visit, when he said to us, "There, gentlemen, is the celebrated Lady Alexandra Duff." He was doomed to disappointment, for it turned out at the show to be

identical with Grandiflora Nivea Plena. Others had had similar disappointments, for Lady Duff turned out to be first James Kelway, then Mrs. Gwyn Lewis, and a host of other things, even to Festiva Maxima, till Mr. Shaylor in disgust, pronounced the Lady a myth, using a famous quotation, "There ain't no such thing." Mr. Kelway finally got so stirred up over the storm of criticism from his angry patrons in this country, that some years later he sent to several of us what he declared was a really truly Lady Duff, accompanied by photographs from his own garden, showing the original plant in flower. I met many others there, whom for lack of time I cannot mention, but I formed friendships with them that have endured to this day. Some of them have passed away, but the greatest thing I learned was that Peony people as a class are mighty fine people. They are true blue. For they grow Peonies, not as a commercial proposition, but because they really love the flower, and find in it a fascination that cannot be resisted.

The Peony is a true aristocrat of the hardy garden. I do not apply this as a mere phrase, for it is true in every sense, both as to its lineage and its associations. In China it is said that the Tree Peony has been their chief pride and glory for nearly 1500 years, a theme for their poets and painters, and prized by their emperors for the beauty and fragrance of its flowers; and for more than a thousand years a record of the characters, qualities, and parentage of the new varieties raised from seed has been kept. In their gardens the Tree Peony is known as the "King of Flowers," and the herbaceous Peony as the "King's Ministers." It is descended from Paeonia albiflora, a native of Siberia. Knowing this, I can well understand why it thrives so luxuriantly in the rich alluvial soil of our western states, and why it is the flower for the great Northwest, enduring, as it does, the most intense cold without injury. This Asiatic Peony must not be confused with the old-fashioned, early flowering red Peony of our grandmothers' gardens, which belongs to an entirely distinct species, officinalis, a native of Europe, the early history of which is intricately woven with a haze of superstition, allegory, and myth. Its magical charms were supposed to ward off witchcraft, and the name Peony is derived from a Dr. Peon, who used its roots as medicine.

The modern Chinensis Peony has only been known in Europe a

little more than half a century. It was under the care of M. Jacques, gardener to King Louis Philippe, that one of the first collections was formed, and some of the first of the fine varieties of today originated. M. Jacques' collection was inherited by his nephew, M. Victor Verdier, who raised a number of fine seedlings. The collection of the Comte de Cussy, an amateur collector, was inherited by M. Calot, of Douai, who continued to raise seedlings till 1872, when his collection passed into the hands of M. Crousse, of Nancy, who made careful selections from the Calot seedlings and sent them out annually until 1879. From 1882 until 1899, Crousse sent out seedlings of his own raising. The Calot-Crousse varieties are noted for their uniform high quality, raising the standard of excellence to a height that has never been surpassed, unless it be by the splendid varieties introduced in recent years by that greatest of all the world's hybridizers, Victor Lemoine, whose establishment at Nancy is at Crousse's old place. All the Lemoine varieties are exquisitely beautiful, but most of them so rare, they are but little known outside of the larger collections.

Another famous French collector of Peonies, contemporary with Calot and Crousse, was M. Mechin, also an enthusiastic amateur, whose grandson, M. A. Dessert, of Chenonceaux, succeeds him, and is considered today the greatest living authority on Peonies. Among his most recent introductions may be found some of the most beautiful additions to the many fine varieties for which we are indebted to the French specialists. Recently a number of fine new varieties, which are yet but little known in this country, have been originated in France by Riviere, Paillet, Brochet and others. To these must be added the beautiful varieties raised by James Kelway, of England, who began his work on the Peony in 1864, and twenty years later catalogued forty-one new varieties of his own raising.

Among those who have been most prominent in the introductions of new Peonies in America which equal those of the finest French introductions, was John Richardson, of Dorchester, Massachusetts. Robert T. Jackson in his paper published in the Transactions of the Massachusetts Horticultural Society for 1904, "John Richardson, His House and Garden" writes: "Mr. Richardson had a perfect passion for horticulture, and every plant in his garden that he loved

so well was a real personality to him. A walk with him about the garden meant a lingering at every step to consider the merits, the history, or some cultural point in regard to the plants that were as his children. When nearly ninety, he planted Peony seeds just the same as in his earlier years, and some of his posthumous seedlings are among his best." His varieties are all of unusual merit. Milton Hill and Paul Fisher are among the best; Walter Faxon stands alone, unapproached by any other Peony in its color, the nearest true deep pink; while Rubra Superba, crimson, and Grandiflora, soft shell-pink, still stand at the head, as the best and very latest of these colors to bloom. H. A. Terry, of Crescent, Iowa, early became interested in Peonies, and produced many varieties, the best probably being Grover Cleveland, Etta, Emma, Princess Ellen, Euphemia, and Stephanie. Writing in 1904 he says, "I am now in my eightieth year, and do not know how long I shall continue to grow Peonies, but I want to be surrounded by them as long as I live. They are like my children, very dear to me."

It was in Boston, in 1906, that I first met Mr. Hollis and saw his beautiful blooms on exhibition. I thought them fine then, and in my garden since they have not disappointed me. He was a genial, kindly gentleman, with means and leisure to devote his time to his favorites. I visited him in 1910 when his Peonies were in bloom. Although stricken then with a fatal illness, unable to walk alone, he sat in the little summer-house overlooking his Peonies, happy in the sight of them, still able to talk with enthusiasm about his treasures and call them by name. Among his many fine ones are Paradise, Welcome Guest, Maude L. Richardson, Standard Bearer, George Washington, Bunker Hill, and Tragedie. Mention must also be made of his Japanese types, of which he raised a number which are distinct and fine.

Mrs. Sarah A. Pleas, now living in Whittier, California at the advanced age of over 83 years, is as actively interested in Peonies as when at her home in Spiceland, Indiana, she raised and introduced Opal, Elwood Pleas, and her now famous Jubilee, which carried off highest honors at the National Peony Show in Philadelphia last year. A. M. Brand, of Faribault, Minnesota, for many years has been giving his attention to the raising of seedling Peonies. His varieties are now attracting a great deal of attention;

his Martha Bullock, best known, was one of the prominent features in the show last year. Among his many new ones I would mention Mary Brand, Richard Carvel, and Francis Willard. E. J. Shaylor of Wellesley Hills, is devoting his later years to raising new varieties, and has already given us Georgiana Shaylor, Mary Woodbury Shaylor, Wilton Lockwood, and a number of others which have received certificates of merit at your shows here. We must not forget to mention Cherry Hill by Thurlow of West Newbury, and Karl Rosenfield, by Rosenfield of Omaha, Nebraska, as being two American varieties of exceptional merit. Some of you may remember the splendid exhibit of some fifty new unnamed seedlings made here two years ago by Prof. A. P. Saunders of Clinton, New York. You will want to keep an eye on his work, for possibly one of these days the long sought yellow Peony may appear in his garden, for he is after it, apparently on the right track, and I shouldn't wonder if he succeeds.

It will be seen, therefore, that nearly all of our modern Peonies are of comparatively recent introduction, and I am greatly impressed by the fact that practically all of the fine Peonies we have today have come to us through that remarkable group in France, Calot, Crousse, Lemoine, and Dessert, most of them having a family relationship, and the few enthusiasts in America, just mentioned, who have taken up the growing of Peonies because they found it intensely fascinating; for the Peony does not attract the commercial grower. In its propagation there is no easy, royal road to quick results. It takes from four to six years before blooms may be had from seed, and if, perchance, one seedling in a thousand has sufficient merit and distinction to justify its introduction as a new variety, it takes many more years to raise by the slow process of division, sufficient stock to be able to offer it to the trade. That is why the new varieties are so expensive; unlike a new Rose or Carnation, which in a few months can be increased to an unlimited supply through cuttings. It takes years to acquire a few plants from a Peony, and even today, some of the old varieties are still scarce.

The professional grower cannot afford to wait so long for results. So most of the work with the Peony has been done by those whose love for the flowers themselves, and the fascination of watching

them grow, has been their chief incentive. Here is an example of your real Peony lover: Two or three years ago I visited your Mr. Fewkes whom all of us Peony people have come to regard in such high esteem. After we had enjoyed the Peonies in his garden we went inside, where in a vase he had three of the most wonderful blooms I have ever seen. They were Lemoine's La Lorraine and Dessert's Thérese and Rosa Bonheur. As we stood admiring them he remarked, "Do you know? it almost seems to me as if it is worth a year of a man's lifetime, just to be permitted to look upon a thing so beautiful!" Truly the Peony is an aristocrat.

Classification.

The Chinensis Peony (albiflora), in its original or wild state, was a single white flower, and the various stages of its transition from its original single type to the perfect double flower, forms the basis of the classification by the American Peony Society of the modern Peony in its various forms as follows: —

Single. Those with a single row of wide guard petals, and a center of yellow pollen-bearing stamens.

Semi-double. Those with several rows of wide petals, and a center of stamens and partially transformed petaloids.

Japanese. These have wide guards the same as the singles, but with the stamens and anthers greatly enlarged into narrow, thick petaloids of various colors, tipped with vestiges of yellow; the anthers are without pollen.

Anemone. A step farther in the process of doubling, with the stamens all transformed into short, narrow petals, forming a round cushion in the center of the flower.

Bomb. The next step, in which all the center petals are uniformly wide, approaching the guards, but distinctly differentiated from them, forming a globe-shaped center without collar or crown.

Crown. In this type wide petals are developed in the center of the flower, forming a high crown, with the narrow short petals forming a ring or collar around it. Often the crown and guards are of one color, and the collar another, or of a lighter shade.

Semi-Rose. Flowers in which the petals are all uniformly wide,

but are loosely built, with a few pollen-bearing stamens visible, or nearly concealed.

Rose. The process of doubling is completed, all stamens fully transformed into evenly arranged wide petaloids, similar to the guards, forming a perfect rose-shaped bloom.

Twelve years ago, when I attended my first Peony show here, Baroness Schroeder was the acknowledged queen. She was beautiful, and among the most costly, being among the very few for which as much as five dollars was asked, and it was common talk then, that the "Peony Boom" had probably reached its height, and would doubtless soon decline. The Baroness is as beautiful today, but no longer queen, for many kinds now bring from ten to fifteen dollars, and twenty-five to thirty dollars is not at all an uncommon value for a number of varieties, and never were these rare varieties more sought after than today.

Among the most talked of Peonies today, besides those of the American growers previously mentioned are first of all Lemoine's Le Cygne, winner of the first prize for the finest single specimen bloom, followed closely by Kelway's Glorious. Along with these should be mentioned Lemoine's Alsace Lorraine, Evangeline, Enchantresse, La Fee, La France, Mirabeau, Mignon, Mont Blanc, Sarah Bernhardt, Solange and Primevere, the nearest approach to yellow; Dessert's Thérese, Francois Rosseau, Mad. De Treyeran, Rosa Bonheur, Tourangelle, and Mons. Martin Cahuzac, the darkest of all Peonies. Kelway's James Kelway, Kelway's Queen, Marchioness of Landsdowne, Miss Salway, Phyllis Kelway, and Venus are all varieties of rare beauty.

Many of the new introductions are only known by reputation, for the expensive kinds are often not allowed to come to perfection, being too frequently divided for the purpose of increasing the stock; it is only when they are grown in private gardens, or in specimen collections, where they may remain for at least four years, that real merits are revealed. Consequently, everywhere, as they develop, we discover new treasures, and alas, too, some few disappointments. Among the pleasant surprises in my collections that I had an opportunity to see in perfection for the first time last year was Galathee, a wonderfully full, strong growing, beautifully formed, flesh white, of great size; Philippe Rivoire, dark garnet, of unusual

form, and long keeping qualities; Madam Gaudichau, nearly as dark, and rivaling Mons. Martin Cahuzac in brilliancy, form, and habit; Madam Savreau, with its delicate combination of lilac-white and amber yellow; Jeanne Gaudichau, wonderfully fine in form and color, and finally Pomponette, with its great, wide-petalled, incurved globes of clear rose. For the first time last year, I saw La France and Le Cygne in all their glory, and many others, because now I have a specimen garden established, where they have been allowed to grow to maturity.

Passing from novelties and scarce kinds to varieties more plentiful which may be had at a cost within the reach of all, and which are obtainable in quantities for mass planting, I would recommend the following list, which comprises varieties that may with certainty be relied upon to flower freely each year under all conditions, all having blooms of the highest quality. The list here given in the various shades covers a period of bloom from earliest to latest in the order named, and coveres a period of from three to four weeks.

White. Boule de Neige, Festiva Maxima, Mme. Calot, Duchesse de Nemours, Couronne d'Or, Albatre, Marie Lemoine.

White, Shaded Cream and Yellow. Lutea plenissima, Alba Sulphurea, Duke of Wellington, Candidissima, Solfatare, Lutea variegata, Primevere, Princess Maude.

Flesh and Light Pink. Umbellata Rosea (the earliest of all), Mme. Coste, Mlle. Rosseau, Marguerite Gerard, Albert Crousse, Eugenie Verdier, Venus, Grandiflora, Modele de Perfection.

Deep Pink and Rose. Edulis Superba, Mons. Jules Elie, General Bertrand, Mme. Forel, Mme. Muyssart, Henry Murger, Milton Hill.

Crimson. Adolphe Rosseau, Pierre Dessert, Mme. Mechin, Bertha, George Washington, Masterpiece, Felix Crousse, Armandine Mechin, Marechal Vaillant, Rubra Superba (the latest blooming Peony of all).

Tricolor. Princess Beatrice, Mme. de Vatry, Alice de Julvecourt, Gloire de Charles Gombault, Philomene, Prolifera tricolor.

The Following is a List of Peonies Especially noted for their Unusually Pleasant Fragrance: Edulis Superba, Comte de Nanteuil, Carnea Elegans (Gr.), Lamartine (Cal.), Mme. Auguste Peltereau, Mme. Geissler, Mme. Thouvenin, Monsieur

Barral, Vicomte de Forceville, Zoe Calot, Dorothy Kelway, Kelway's Glorious, Splendida, Venus, Bertha, Enfante de Nancy, Galathee, La Fee, Mme. de Treyeran, Marcelle Dessert, Mont Blanc (Lemoine), Mireille, Mignon, Primevere.

A Short List of the very best Singles will Include: Albiflora The Bride, Pride of Langport, Madeleine Gauthier, Stanley L'Etincelante, Austin Chamberlain, The Moor.

Special Fine Ones in the Japanese Section are: Attraction, Flamboyant, Fuyajo, Ama-no-sode, Margaret Atwood, King of England, Tora-no-Maki, Lemon Queen, Cathedral, Apple Blossom.

Succession of Bloom.

By including the various early-flowering species, hybrids and Tree Peonies in one's collection, the blooming season may be extended over a period of fully two months. The Tree Peonies bloom quite a month ahead of the Chinensis, beginning early in May. As they do not die to the ground each year, they form in time woody shrubs four to five feet in height, their immense strikingly beautiful blooms sometimes a foot in diameter; they are a wonderful sight. There are color schemes among them never found in the herbaceous section, brilliant scarlets, dark maroons and rich wine colors, delicate blush, pure pink and art shades of mauve and violet. Most of the varieties introduced by the European growers are full-double, while a large number of the Japanese sorts are semi-double and single, with a large cushion of thick golden stamens in the center, which produces a beautiful effect. The Tree Peonies as shown here on the screen were grown in Professor C. S. Sargent's garden at Brookline, mostly from seeds of the Japanese sorts. Seeds should be sown immediately after they ripen, either in the open ground protected by a slight covering, or in boxes placed in a cold frame. The young plants will appear the following spring, and will produce varieties equal in every way to the named kinds.

Peony Lutea, a deep golden yellow single Tree Peony was discovered a few years ago in the Mountains of Yunnan by the Abbe Delavay. Crosses from this were made by Lemoine with other Tree Peonies. One of them, La Lorraine, was exhibited by me at

the American Peony Show in Philadelphia last June, and was given a special Award of Merit. Its blooms, six inches in diameter, are fully double and are a deep yellow. A new Lutea hybrid soon to be introduced to the trade is Souvenir du Maxime Cornu, a deeper color with a shading similar to that in the Mme. Edward Herriot Rose. Lutea and its hybrids bloom later than the other Tree Peonies.

The dainty fennel-leafed Peony, P. tenuifolia, follows the Tree Peonies, and its dazzlingly brilliant scarlet flowers always attract attention. It requires careful cultivation and only grows about a foot high. Next in point of interest and season of bloom are Lemoine's Wittmanniana hybrids, produced by crossing the pale yellow Peony Wittmanniana, itself a rather difficult species to grow, with P. Chinensis, resulting in types of strong, vigorous growths, with handsome decorative foliage and large single flowers. There are four of them: Avante Garde, pale rose; Le Printemps, creamy yellow; Mai Fleuri, white shaded salmon; and Messagere, sulphur white.

The Officinalis types begin to bloom almost invariably ten days before the Chinensis varieties. Officinalis rubra, the brilliant early red of our grandmothers' gardens belongs to this species, which is a native of Europe. There is a white one, Officinalis alba plena, and a very beautiful large flowered pink one, Rosea Superba, besides a number of named single and double ones not commonly seen. Sabina, L'Oriflamme, Ourika, and La Brilliant are very attractive. Most of the other species are of little interest to the average grower, but I have cut blooms of Triternata and Arietina in April, and of Rubra Superba the 27th of June, a season of quite two months.

Cultivation.

The cultivation of Peonies is so simple that lengthy instructions seem unnecessary and confusing. They will grow in any situation and in any soil, where one would attempt to raise corn or potatoes. In a light sandy soil they bloom earlier, mature more quickly, the colors are lighter and the season of bloom shorter than when they are planted in a heavy clay loam, where it takes the young plants

a year or more longer to reach perfection, but here the growth is stronger, the colors more brilliant, and the flowers are larger and of longer duration. Exactly the same difference is observed between plants grown in the south and middle states, and those grown far north. The Peony is the flower for extremely cold climates, but may be grown in California and in the south if given congenial loamy soil and abundance of water during the growing season and a situation shaded from the sun during the heat of the day.

Peonies are gross feeders, reaching their greatest perfection when well fed and the ground frequently cultivated, until the buds begin to show color. If a drought occurs at that stage they should be well watered. Two things they promptly resent: sour, acid soil and fresh manure in direct contact with the roots when first planted. While they absorb an abundance of food when well established and during their active growing period, to plant the young roots in soil overloaded with fresh manure, especially if it is sour, is sometimes fatal and invariably causes them to become sick. This is undoubtedly the cause of most of the so-called "club root."

The effect is a production of many weak stems, which fail to mature to buds. Peonies should be planted in fresh soil, and any manure used should be thoroughly rotted, carefully worked in, and not allowed to come in direct contact with the roots. Plant so that the eyes are two to three inches below the surface of the ground (too deep planting is injurious). Feeding should be in the form of a good coat of manure over the surface after the ground freezes. This prevents the roots from being thrown out from the heaving caused by alternate freezing and thawing. This covering can be worked into the ground a little distance away from the crowns in early spring, and will furnish the food they need and can then assimilate as active growth begins.

When once planted, let them alone for as many years as they seem to thrive, only dividing and replanting when the plants show indications of deterioration; unless for the purpose of increasing the stock which is another matter. For the purpose of propagating, they should be divided every second or third year, but for garden effect Peonies usually reach perfection the fourth year, continuing in good condition several years longer, and in many instances old

clumps fifteen to twenty years of age continue to thrive. As a general rule, however, eight years is about the limit.

When the clumps begin to show the necessity for replanting, it is best to start again at the beginning with small divisions of clean, smooth roots with three or four eyes, forcing the plant to begin again, and form an entirely new root system. Divisions consisting of large chunks of old crowns simply lie inactive in the ground and sometimes decay entirely. It is a common mistake to purchase old, heavy clumps, with the expectation of getting immediate effect and better results. For the first year probably one may, but never thereafter.

Time to Plant.

Any time in the year when the ground is not frozen, Peonies may be moved successfully, except from the time the buds begin to form until the foliage is matured and the new roots complete their growth, about the middle of August. The very best time is in September and early October. The growth then is fully completed, and the roots in a dormant state. Planted then, the new feeding roots soon begin to form, and strong roots almost invariably bloom the following June. November and December planting is perfectly safe, but bloom must not be expected the first year, and early spring is as good a time to plant as very late fall. If one cannot plant in September or October, it becomes merely a matter of convenience whether to plant in fall or spring.

Diseases.

The Peony has always been considered singularly free from diseases or insect pests, and to all intents and purposes, so far as the amateur is concerned, this is still true. There are two troubles, however, which within the last few years have given rise to a great deal of discussion, most of which I believe has been misleading, and since scientists at a number of experiment stations where investigations have been undertaken, do not fully agree upon the nature or the cause of the trouble, and do not suggest a remedy,

I will simply state my own experiences and conclusions, which I feel sure will tend to allay any needless apprehension on the part of the amateur gardener.

In certain seasons under favorable conditions Peonies are subject to fungous attacks manifested first by black spots on the leaves, second, by a blighting of the buds when half opened, or the decaying of the half-opened buds at the base of the petals, deforming the flower; third, the extension of the fungous growth down the stem, sometimes its entire length, causing what is commonly called "stem rot," which in severe cases extends down into the roots. Sometimes the stem is first affected, causing it to "damp off" and wilt. The conditions favorable to the spread of fungus seem to be moist, humid weather, with frequent showers, followed by hot sunshine. It may be quite severe one season and disappear entirely the following season, and unless the roots themselves are affected, there seems to be no permanent injury, and it is only in a few sections where serious harm has been done, and where I believe the same soil condition and overfeeding, which I have previously explained, have something to do with it. Spraying with Bordeaux mixture as a preventative has been recommended. Where roots are badly affected it is best to replant them in perfectly fresh, sweet soil, free from manure, cutting away all affected parts.

The other trouble is variously known as "Nematodes or Eel worms," "Club roots," "Lemoine Disease," etc. There has been much discussion and difference of opinion regarding these so-called diseased roots. I believe it to be more a condition than a disease; a condition brought on usually, as previously stated, by the excessive use of manure when the roots are newly planted and before they can properly assimilate the overdose. It is manifested by distorted, undeveloped roots, covered with lumpy knots and nodules. An unusual number of eyes are formed, sending up many stems of weak growth, which do not mature flower buds. This condition can also be produced by too deep planting, the use of large divisions of old worn-out roots, or by planting in a sour, pasty soil, or anything which seems to check a healthy action of the roots.

My remedy is to cut the infected roots into very small divisions of one or two eyes, shorten the roots to two or three inches, and

replant in perfectly fresh soil without any manure. This forces an entirely new system of root growth, and so treated, the trouble usually disappears in a year or two. Some varieties appear to be more susceptible than others, and occasionally the trouble persists for a number of years. If these happen to be cheap kinds, it is usually better to discard them and start new with clean roots; with expensive varieties, however, it pays to have a little patience with them. Practically all the novelties from Europe that have come to us from very old gardens, are affected when we first get them, and if we were to reject them on this account, we would have to forego such wonderful varieties as Le Cygne, La France, Mont Blanc, etc., in fact, nearly all the fine new French varieties, all more or less affected when first received, but which after coming from old, worn out soil, soon outgrow this trouble when planted in new ground here. Remember, you can take the smoothest, healthiest roots from one place, plant them in a sour soil over-saturated with fresh manure, and get the most beautiful specimen of club root the following year. Fortunately it is not contagious as many have claimed, for you can plant affected roots in good soil side by side with healthy ones, and I have never known a single case where the healthy roots were affected by them, which convinces me that the sick plants are simply suffering from a cause similar to what we would describe as an inactive liver or a bad case of biliousness in our own systems.

To sum up, fungous attacks are local, due to weather conditions, and only occasionally seriously destructive. Club roots are due to overfeeding, improper soil or planting, and is not contagious. Cut off and burn dead foliage in the fall and use hardwood ashes or lime as a fertilizer for acid soil, applying manure as a top dressing only until plants are in active growth.

THE DISEASES OF ROSES.

By Louis M. Massey, Assistant Professor of Plant Pathology, Cornell University, Ithaca, N. Y.

Read before the Society, February 23, 1918.

The John Lewis Russell Lecture.

The rose was probably the first flower cultivated for ornament or for perfume. Being native to the north temperate zone it occurs within these limits entirely around the world and is grown in all temperate climates. Millions of roses for the market are produced in large glasshouses in order that blossoms may be had throughout the year. In the value of the crop the rose easily leads all other flowers grown under glass, while its importance as a garden plant is too well known to need comment.

That the rose is subject to numerous diseases is a matter of common observation. Doubtlessly all growers and fanciers are familiar with the two most serious diseases, black-spot and mildew. These may be said to be ubiquitous, while the attention of rosarians is focused on various other diseases of more or less general occurrence as they assume an epiphytotic nature. Some of the diseases are fairly common in the wild but have come into prominence only as the rose has become of commercial importance. Other diseases have probably had a later development and are becoming of more and more importance under present intensive methods of propagation. In catering to the demands of the trade and of the fanciers, many new types have been developed by breeding and it is probable that the natural resistance of wild forms brought about through the process of the survival of the fittest has been sacrificed.

The scarcity of definite information is one of the noticeable phases of the subject "diseases of roses." This situation finds explanation in the fact that diseases of ornamental plants in general

usually have been studied by pathologists either as an incident to other investigations or by mycologists interested in taxonomy. Many recommendations for the control of diseases have been made without due consideration being given to the conditions and needs either of the commercial grower or of the fancier. Sprays which will discolor foliage and buildings may be more objectionable than the disease itself, with the result that growers have been loath to use many of them even though their efficiency in suppressing specific diseases has been established. Further investigation of rose diseases is highly desirable.

Black-spot.

Probably the most common and destructive disease of the rose is black-spot. It occurs wherever roses are grown, nearly all the cultivated varieties both out-of-doors and under glass being affected, although not all varieties are equally susceptible. Roses of the Hybrid-Perpetual and Pernetiana groups are considered most susceptible. Laubert and Schwartz (1)[1] hold that bushy sorts are more susceptible than climbers and also that those with thin leaves are more liable to attack. The writer has observed that practically all bush roses, Hybrid-Perpetuals, Hybrid-Teas, Teas, and Pernetianas, are more or less susceptible, while those of the types Multiflora and Wichuraiana are comparatively free from attack. Hybrids of *Rosa rugosa* and moss roses are rarely affected, although Scribner (2) states that "moss roses and those with thick rough leaves seem to suffer more than other kinds." This worker may have confused an abnormal condition of the leaves of moss roses known as "bronzing" with black-spot.[2]

Names applied to the disease. Several names have been used to designate the disease under consideration, among which are black-spot, leaf-blotch, star-shaped leaf-spot, and rose-actinonema. It is perhaps best known as "black-spot," this name being generally accepted and adhered to both by scientific workers and growers.

History and distribution. The black-spot of roses is not a new

[1] Numbers in parentheses refer to a bibliography at the end of this paper.

[2] Stone, G. E., and Smith, R. E. The bronzing of rose leaves. *In* Report of the botanist Mass. Agr. Ex. Sta. Rept. **11**: 156–159. 1899.

disease, being first noted in Italy in 1824.[1] It was probably present many years before this date and has long been known to the rose-growers of Europe. In 1825 the Hybrid-Perpetual began to take first place in the rose world, and as this class is probably the most susceptible to black-spot it is not surprising that references to the disease began to appear more and more in articles on the cultivation of roses.

Saccardo [2] notes the occurrence of black-spot in France, England, Italy, Belgium, Germany, Austria, Portugal, and North America. No special attention has been given the disease by American investigators until in more recent years when, due to the more intense cultivation of the rose or the production of more susceptible varieties, it has come to be considered the worst enemy of this plant. Possibly the first report of the disease in America was by Scribner (2) in 1888. Both Maynard (3) and Humphrey (4) record observations on the disease the following year. Subsequently the disease has been reported as occurring in practically every part of the United States and it is safe to state that black-spot exists wherever roses are grown.

Economic Importance. Black-spot is probably the most important of all the many diseases of the rose. It is both an enphytotic and an epiphytotic disease of out-of-doors plants, being more or less abundant every year and in seasons especially favorable for its development, attacking and defoliating a large percentage of all garden roses. Under glass the disease is practically always present, ready to become epiphytotic as soon as proper conditions of temperature and moisture develop. The extreme susceptibility of Hybrid Perpetual roses to black-spot is one of the factors contributing to their decrease in popularity. The great susceptibility of the Pernetiana group to this disease threatens to be the limiting factor in its popularity unless some practical methods of control are developed.

Symptoms. Although the lesions sometimes occur well down on the petioles and even in the case of some varieties on all the aerial parts of the plant [3] the disease is confined practically entirely to the

[1] Fries, E. Observationes mycologicae, p. 207.

[2] Saccardo, P. A. Sylloge fungorum **3**: 408. 1884.

[3] Chifflot, J. The extension of Marsonia rosæ on rose bushes. Assoc. Franc. Avanc. Sci. Comp. Rend. **43**: 426–428. 1914.

leaves. The more or less circular spots may reach a diameter of a centimeter or more, are black in color and are characterized by radiate-fibrillose margins. They usually appear late in the spring or early in the summer and occur only on the upper surface of the leaf. The spots are small at first but increase in size as the disease progresses. Often a number of them coalesce and in severe attacks the entire leaf may be covered with large dark patches. In the latter part of the season the spots frequently grow light in color and dry in the center showing this part of the leaf to be entirely dead.

Very commonly the leaf tissue adjacent to the black spots becomes chlorotic before the leaves fall from the plant, and not uncommonly all of the uninvaded tissue becomes yellow before defoliation occurs. The leaflets may turn yellow in spots, while sometimes the yellow area is limited to a band outside the black spot. Commonly, and especially during the autumn the yellow color appears at the apex of the leaflets whence it spreads downward and is succeeded by brown. A leaf with a green base and brown tip with a yellow band between is very characteristic of this disease.

Premature defoliation is one of the most pronounced characteristics of this disease. Affected leaves may fall before they turn yellow, the slightest jar or breeze often causing them to drop in great numbers. Diseased plants usually have a partially defoliated appearance.

The size and shape of the black spots, the rapidity, and the extent of defoliation of plants, seem to vary with the variety. No reports of observations on these points are to be found in literature.

Etiology.

Black-spot of the rose is caused by a fungous parasite, *Diplocarpon rosae* Wolf, long known under the name of *Actinonema rosae* (Lib.) Fries.

Life History of the Parasite.

Diplocarpon rosae has two phases in its life cycle — an actively parasitic phase developed during the summer and a saprophytic

phase in which the fungous lives during the winter on dead and decaying tissue.

An examination of the lesions on the leaves during the summer will show the presence of small black pustules which are the fruit-bodies of the fungus. In these fruit-bodies the conidia or summer-spores are born. These spores are matured rapidly during the growing season and are blown about by the wind, thus distributing the fungus and bringing about successive infections with new crops of conidia. This phase of the fungus is the one most commonly met with and has been known under the name of *Actinonema rosae* (Lib.) Fries for many years.

During the winter the sexual or ascigerous phase develops. When leaves affected with black-spot fall to the ground during the summer and autumn, the fungus does not die but lives over winter as a normal saprophyte. If examined microscopically during the spring it will be found that another spore-form has developed. In this stage spherical fruit-bodies (perithecia) bearing numerous sacs or asci, each of which contains eight ascospores, are produced in the old leaves lying about on the ground. These fruit-bodies serve to carry the fungus over the winter, the spores being mature at the time of opening of the rose leaves in the spring.

Inoculation. The old leaves on the ground are to be considered the chief source of primary inoculum in the spring. However, the fungus is carried over winter on plants under glass from which conidia could be carried readily by the wind to the newly developing leaves on out-of-doors plants. Growers frequently buy pot grown plants in the spring to plant in their gardens and are likely to thus carry the fungus to the plants which were out-of-doors during the winter. Scribner (2) who was acquainted only with the asexual stage suggests that the spores (asexual) lodge on the buds in the autumn and remain there dormant until the leaves have expanded the following autumn. In warmer climates the conidia may live over winter and serve as inoculum the following spring. No special investigations on this point have been reported in literature. Wolf (5) could find in wintered material no acervuli which were bearing conidia. It seems very improbable that the conidia winter in any sections of Massachusetts or places having similar temperatures. The evidence derived from observations

on the parasite warrant the conclusion that, as has been found to be true of many fungi, this fungus is carried through the winter on fallen leaves in which the ascosporic stage develops the following spring.

Although when mature the asci discharge the spores through an apical pore formed by the rupture of the wall, the spores are apparently not discharged with violence. Wolf states that they merely pile up in a whitish heap in the opened perithecium. How they reach the unfolding leaves of the plant has never been definitely determined, but it is probable that insects, splashing rain, and possible the wind play an important part. Man, in cultivating, may also serve as an agent of inoculation.

The maturity of the ascospores and the occurrence of rainy periods when the spores are mature are factors governing spore discharge.

Inoculation. The ascospores which are probably distributed during a rainy period require moisture to germinate and penetrate the host. They germinate within twenty-four hours. Wolf (5) found the period of incubation to be about ten days, small black areas being evident on May 7 from inoculations made on April 27.

Infection. Infection occurs by the entrance of the germ-tube directly through the cuticle of the leaf. The resulting mycelium remains for some time immediately beneath the cuticle, later penetrating the tissues below, first filling the epidermal cells and only in advanced stages of the disease penetrating the mesophyll. The black appearance of the spots is not due to the fungus, which is almost colorless, but to the disintegration of the cells below the spot.

Environmental Relations.

Temperature and especially moisture are factors which may influence the severity of the disease by their effect on the parasite and the host. It is a matter of common observation that greenhouse roses are more subject to this disease in the spring and autumn when extremes of temperature are most likely to occur. Frequent rains and general cloudiness are important factors at these times. Many growers of indoor roses claim that if the plants

can be carried through late summer and autumn prior to the time when firing begins without suffering an epiphytotic of black-spot there is little danger of plants being badly diseased during the winter. No doubt exceptions occur, but the most badly diseased houses noted by the speaker in visits to growers were those where firing was begun late. The natural heat of summer and artificial heat of winter quickly dries off the foliage and must thus be instrumental in lessening infection. It is very improbable that the ascigerous stage develops in the fallen leaves under glass.

Out-of-doors, where primary infection is initiated by ascospores formed during the winter in old leaves left lying on the ground, it is obvious that the spring rains are important factors, as moisture is necessary for the discharge of these ascospores from the perithecia. Moisture supplied either by rainfall or by dew is probably necessary for the germination of both the ascospores and conidia so that a greater amount of disease may be expected during rainy seasons. It is a matter of common observation that whereas more or less black-spot is present every year, epiphytotics on out-of-doors plants only occur during seasons of heavy rainfall. The precipitation of dew on the foliage during the autumn when cold nights and warm days prevail may account for the increased amount of disease at this time. Lesions on the leaves are more numerous and perhaps larger in rainy, cloudy seasons than in dry seasons. When conditions favorable to black-spot are known a big step will have been taken toward the control of this disease, especially under glass.

Control.

Sanitation. Since the fungus lives over winter in fallen leaves, where the ascospores are produced which serve as the source of primary infection in the spring for out-of-doors roses, it follows that these should be carefully collected and burned late in the autumn. It is also advisable to keep the benches free from old leaves affected with the disease, for they bear the summer spores and thus serve as sources of infection. Where a rose garden consists of only a few plants much may be accomplished by picking and burning every leaf as soon as it shows signs of disease.

Protection. Protection by spraying is the usual recommendation for the control of the disease of roses caused by *Diplocarpon rosae* Wolf. Of the numerous fungicides recommended in literature probably bordeaux mixture and ammoniacal copper carbonate are the two most often mentioned. Statements to the effect that the latter fungicide is as efficacious as the former are common in literature. Results of the following experiments conducted in 1917 indicate that ammoniacal copper carbonate is not as efficient as bordeaux mixture for the control of the disease. A mixture of 90 parts finely ground sulfur and 10 parts powdered arsenate of lead dusted upon the plants proved to be as efficient as bordeaux mixture and its use rendered the plants far less unsightly than the latter fungicide. Lime-sulfur solution, 1 part of the commercial concentrated solution to 50 parts water, was found to be more efficient than ammoniacal copper carbonate and probably as much so as bordeaux mixture and the sulfur-lead dust. However, lime-sulfur discolors the foliage almost as much as bordeaux mixture.

Experiments in the nursery.

In the experiments performed in the nursery there were nine rows of rose plants, each of a single variety, the following eight varieties being involved: J. B. Clark, Gruss an Teplitz (2 rows), Prince Camille de Rohan, Clio, Mrs. John Laing, John Hopper, Madame Gabriel Luizet, and Margaret Dickson. A part of each row of plants was included in each of the different plats. There were 450 plants in each of the five plats which were treated as follows: plat 1, dusted with sulfur 90 parts, and arsenate of lead 10 parts; plat 2, sprayed with bordeaux mixture, 5–5–50; plat 3, sprayed with lime-sulfur solution 1 to 50; plat 4, sprayed with Hammond's copper solution,[1] 1 to 100; plat 5, untreated.

The first applications of dust and spray were made on May 31. All of the buds had opened and most of the leaves were well developed on this date. Subsequent applications were made on June 12, June 23, July 4, July 24, August 2, and August 25. Final data were recorded on September 13, the middle row (variety Clio) being

[1] Hammond's Copper solution is a cupro-ammonium wash containing according to the manufacturer 3.05 percent metallic copper.

selected and the number of infected leaflets counted on twenty plants. The part of the row included in each plat consisted of approximately sixty plants, and the data were obtained from every other plant in the central area. Defoliation was not taken into consideration. From observations it was determined that the amount of defoliation varied directly with the percentage of leaflet infection in the various plats.

The percentage of diseased leaflets for each plat was as follows: sulfur 90 parts and arsenate of lead 10 parts, 7.66; bordeaux mixture 5–5–50, 8.51; lime-sulfur solution 1 to 50, 24.43; Hammond's copper solution 1 to 100, 37.77; untreated 80.

A point to be noted in the above experiment is the fact that the plat treated with lime-sulfur solution was situated on low ground where there was poor drainage. Owing to the heavy precipitation throughout the season these plants were subjected to more moist conditions than those in the other plats which had better drainage. Consequently it is probable that lime-sulfur is more efficient in the control of rose black-spot than the above results would indicate. This probability is further emphasized by the following experiments.

Experiments in the test garden of the American Rose Society.

A somewhat similar experiment for the control of *Diplocarpon rosae* was conducted in the test garden of the American Rose Society at Ithaca, New York. Here the plants were arranged in beds, there being on an average, four varieties of six plants each in a bed. There were six plats, each of which included twelve beds, treated as follows: plat 1, dusted with sulfur 90 parts and arsenate of lead 10 parts; plat 2, sprayed with ammoniacal copper carbonate;[1] plat 3, sprayed with lime-sulfur 1 to 50; plat 4, sprayed with fungi-bordo 5–5–50;[2] plat 5, sprayed with Hammond's copper solution 1 to 100; plat 6, untreated.

[1] The ammoniacal copper carbonate solution was composed of 5 ounces of copper carbonate, 3 pints of ammonium hydroxid (sp. gr. 0.90), and 50 gallons of water.

[2] Fungi-bordo is a dry, finely ground mixture of anhydrous copper sulphate and hydrated lime. It was used at the rate of 10 pounds to 50 gallons of water which is approximately equivalent to a 5–5–50 bordeaux mixture.

During the summer thirteen treatments were made on the following dates: May 26, June 4, June 11, June 18, June 24, July 3, July 13, July 20, July 31, August 9, August 21, August 29, and September 9.

Final observations were made on September 24. Due to the fact that the plats did not contain the same varieties it was impossible to compare the treatments by determining the percentage of diseased leaflets. Gross observations were made by the writer who also obtained the opinion of the gardener and others not directly interested in the work. The plants of the dusted plat and those sprayed with fungi-bordo and lime-sulfur solution stood out in sharp contrast to the other plants in the garden due to their healthy leaves and heavy foliation. It was impossible to determine from gross observations which of these treatments was most efficient. The plats treated with ammoniacal copper carbonate and with Hammond's copper solution contained but slightly less affected plants than the check, and marked defoliation occurred in all three plats.

From these experiments it would seem that lime-sulfur solution 1 to 50, bordeaux mixture 5–5–50, and the dust mixture consisting of 90 parts finely ground sulfur and 10 parts arsenate of lead, are three efficient fungicides for the control of black-spot of the rose, while Hammond's copper solution and ammoniacal copper carbonate solution are much less efficient. Due to its ease of application and to the fact that its use discolors the foliage less than the other two, the sulfur-lead dust [1] is to be given the preference.

Powdery-mildew.

Powdery-mildew is one of the most common and injurious diseases of the rose, especially of plants grown under glass. Out-of-doors plants are commonly attacked, the Crimson Rambler and related forms being especially susceptible. Varieties differ greatly in susceptibility. The disease was held by investigators to occur

[1] The sulfur-lead dust was obtained from the Union Sulphur Company and was so finely ground that at least 98 per cent would pass through a 200-mesh sieve. It was applied with a hand duster.

on the peach, apricot, almond, and cherry-laurel until Woronichin (9) proved it to be confined to the rose.

Symptoms. The first signs of the disease are grayish or whitish spots on the young leaves and shoots. Frequently, the unopened buds are white with mildew before the leaves are affected to any great extent. These spots quickly enlarge, a felt-like coating of a white, powdery appearance being commonly found on the stems and thorns. Later the mildew appearance is less conspicuous or entirely lost, the affected areas turning black.

Dwarfing, curling and various deformations of young leaves, stems and buds occur. Injured leaves may fall, and the leaf surface of the plant may be greatly reduced. Growth and flower production is materially interfered with, young buds being frequently attacked and rendered entirely worthless.

Etiology.

Powdery mildew is caused by the fungus *Sphaerotheca pannosa* (Wallr.) Lév. *rosae* Wor.

Identity. The fungus was first reported by Wallroth[1] under the name of *Alphitomorpha pannosa.* Subsequently the fungus was called *Eurotium rosarum* by Greville,[2] *Erysibe pannosa* by Schlechtendahl[3] and Link,[4] and *Erysiphe pannosa* by Fries.[5] Léveillé[6] transferred the fungus from the genus Erysiphe to Sphaerotheca.

Salmon (7) states that roses in America are attacked by two species of fungi, viz., *Sphaerotheca pannosa* and *S. humili* and that the American fungus which has passed under the name of *S. pannosa* is for the most part *S. humili.* He had seen only two specimens of true *S. pannosa* from America. Stewart (8) reports several cases of rose-mildew in which the fungus was unquestionably *S. pannosa.*

[1] Wallroth, K. F. W. Naturgeschichte des Mucor Erysiphe L. Berl. Ges. Nat. Freunde Verhandl. **1**: 6–45. 1819.
[2] Greville, R. K. Scottish Cryptogamic Flora **3**: pl. 164. fig. 2.
[3] Schlechtendahl, D. F. L. von. Flora Berolinensis **2**: 168–170. 1824.
[4] Link, H. F. Willdenow, Species Plantarum **6**: 104. 1824.
[5] Fries, E. Systema Mycologicum *3*: 236. 1829.
[6] Leveille, J. H. Ann. sci. nat. III, **15**: 138, pl. 6, fig. 8. 1851.

Woronichin (9) reports experiments with the fungi causing powdery-mildew of the rose and peach in which negative results were obtained from inoculations on the peach with the fungus causing the disease of rose. He also states that a study of the perithecia, asci, and spores of the fungi from the two hosts showed differences in their dimensions. He concludes that the biological and morphological differences noted are sufficient to separate the species into the varieties *S. pannosa rosae* and *S. pannosa persicae.*

Morphology. Under the microscope the white patches on the rose plant are seen to consist of a mould-like growth (mycelium) composed of slender white threads with numerous branches which form a net-work over the surface of the leaf. At various points upright branches are developed which bear chains of egg-shaped spores. These spores are easily detached and lie in masses giving the older spots a powdery appearance. They are produced throughout the year under glass, but only during the summer on plants growing in the open.

At various points the mycelial threads are attached to the surface of the host, minute branches called haustoria being sent into the outer cells of leaf or stem from which the fungus obtains its food supply. The cells into which the haustoria are sent may be stimulated at first but are killed sooner or later.

Somewhat rarely, and probably only out of doors, ascospores are produced in spore-cases called asci which in turn are born singly in dark fruit-bodies (perithecia) embedded in the felt-like growth on stems, thorns and leaves. These ascospores can live over winter out-of-doors and may serve as the inocula the following spring.

Life history of the parasite.

Norton (10) states that it is probable that the mycelium of the fungus is able to live over winter out-of-doors in the buds of roses. Others assert that the mycelium is perennial, reappearing in successive years on the same shoots of infected plants. Salmon notes that in specimens examined the fresh centers of disease which appear in the spring did not occur at the places where the fungus grew in the previous year. The fact that sexual spores are somewhat rare

might be considered as evidence favoring the claim that the mycelium is perennial. In countries of warm climates the fungus is doubtless carried throughout the year in the asexual stage as is true on roses grown under glass where the temperature does not fall sufficiently low to kill the spores and mycelium.

There are, then, two and possibly three sources of primary infection in the spring. First and of primary importance is the production of ascospores which live over winter in perithecia on plants grown out-of-doors. These spores are distributed by the wind, rain, man, and other agents and, under proper conditions of temperature, moisture and position, germinate and produce infection. The second source of inoculum for roses in the open is the distribution of asexual spores formed throughout the year on roses under glass. These spores are very light and might readily be carried by the wind for great distances. Growers frequently buy pot-grown roses in the spring to plant in their gardens. Some of these plants may be affected and often the fungus spreads quickly to other bushes. The third possible source of inoculum is the production of conidia by mycelium which has overwintered on plants in the open. Some doubt exists, as stated above, as to whether or not the mycelium is perennial in sections having relatively cold winters.

Spores, then, either ascospores or summer spores, are carried to rose plants in the spring where under proper conditions they germinate. The germ-tube coming from the spore quickly elongates, branches and soon establishes a food relation with the host by sending haustoria into the epidermal cells. Very soon thousands of new spores are produced which when mature are carried by the slightest air currents to other parts of the plant and to other bushes.

Many florists believe that rose mildew is caused by drafts, having noticed the initial appearance of the disease in the areas in the greenhouse near doors or broken panes of glass. Needless to say mildew cannot develop without the presence of the fungus, the drafts serving as bearers of spores and possibly bringing about favorable conditions for infection, either by its effect on the host or on the fungus, or on both.

Control.

A. Roses out of doors. The efficiency of sulfur fungicides for the control of rose mildew has long been recognized. Lime-sulfur and other liquid sprays are more or less effective but owing to the time and labor involved in applying spray solutions and to the unsightliness brought about by their use, an efficient dust mixture is preferable. Stewart (11) reports good control of rose mildew by the use of a dust mixture consisting of 90 parts sulfur and 10 parts arsenate of lead. A similar mixture was used by the writer in 1917 and it was found to be decidedly more efficient than lime-sulfur solution 1 to 50 or bordeaux mixture 5–5–50.

A row of Crimson Rambler bushes planted thickly and forming an arbor about five hundred feet in length was divided into four sections of equal length and treated as follows: section 1, sprayed with bordeaux mixture 5–5–50; section 2, sprayed with lime-sulfur solution 1 to 50; section 3, dusted with sulfur 90 parts and arsenate of lead 10 parts; section 4, untreated.

The first application of dust and spray was made on August 2. Mildew appeared between this date and August 16, when the second application was made. Another application was made on August 25. The experiment was terminated on September 13. On this date the dusted bushes were practically free from mildew, only a few infected shoots being apparent. The bushes treated with bordeaux mixture and lime-sulfur were severely infected and were but slightly less free from the disease than the untreated bushes. Besides its superiority in fungicidal value the dust mixture rendered the plants far less unsightly than the bordeaux mixture or the lime-sulfur solution. The latter fungicide appeared to be slightly more efficient than bordeaux mixture.

B. Under Glass. Florists commonly paint the heating pipes with mixtures of sulfur and lime for the control of mildew, the sulfur being thus evaporated and condensed on the plants where the fungus is killed. Maynard (12) recommends the use of evaporated sulfur, a small kerosene stove with a thin iron kettle being used and the sulfur kept boiling two or three hours a week in a closed house. Both methods have given good results, the use of a

kerosene stove or other means of heating the sulfur being necessary at times when the houses are not artificially heated. The use of the sulfur-lead dust on roses under glass will undoubtedly control the disease and may in many cases be a more desirable method than that of using evaporated sulfur.

Crown-Canker.

An important disease of the rose, to which the name crown-canker has been given, was first observed by the writer (13) in September, 1916, affecting American Beauty plants. The grower stated that he had had the disease under observation during the past four or five years, a few plants being affected each year and the disease being confined to a single house.

Subsequently plants affected with the crown-canker disease have been received from eight growers, the states of Missouri, Pennsylvania, Indiana, Michigan, Massachusetts, and New York being represented. A Missouri grower observed the disease in 1916 on the varieties Hoosier Beauty and Ophelia growing on their own roots. An eastern grower was of the opinion in 1916 that all of his many thousands of plants were affected, and it is the opinion of the writer, after having examined his plants, that at least a very large percentage of them were diseased. During the four years prior to 1916 increasingly poor results were obtained by this grower who when interviewed in November, 1916 was planning to destroy his plants, sterilize houses and soil, and begin anew with healthy stock.

Rose plants of the varieties Hoosier Beauty, Ophelia, Hadley, Mrs. Charles Russell, Sunburst, American Beauty, and many seedlings have been observed affected with the disease. Both grafted plants and those growing on their own roots are affected. It is questionable whether or not any variety is immune. Indications are that this may prove to be the most important disease of roses grown under glass. To date no record has been made of this disease on out-of-doors plants.

Symptoms. Diseased plants are affected at the crown, usually just at the surface of the soil, the lesion in advanced cases frequently

extending several inches above the soil. The writer has not determined to what extent the root systems are commonly affected. However, lesions have been observed near the tips of roots of four-years-old plants, and of several plants examined unquestionably the entire root system of each plant was affected. The union of scion and stock, and the area immediately above, is the most common point of attack.

The first indication of the disease is a slight discoloration of the bark. As the disease advances the color deepens to black and the tissue appears water-soaked (plate 1, figs. 1, 3). At first the lesions are irregular in outline with a somewhat sharply defined margin. Later as the affected area increases in size the blackened color of the diseased area is blended more with the healthy tissue. The lesions frequently encircle the stem. Soon cracks appear in the bark extending in to the wood (plate 1, fig. 2). Later a swelling of the stem as from girdling occurs at and above the affected area, the cracks becoming deeper and more evident. In old lesions the black, water-soaked appearance is lost. Sometimes the stem is encircled by a shrunken area which contrasts sharply with the swollen area immediately above.

One very noticeable characteristic of this disease is the punky consistency of the diseased tissue, especially that affected underground. When scraped, the bark, sapwood and frequently the roots appear punky and lifeless, not uncommonly in areas where no definite lesion is evident.

Suckers developing from the roots of diseased plants are usually spindling and yellow. They are commonly affected at the point of attachment to the main stem, the tissue being blackened and of a punky texture.

Affected plants do not die quickly but linger on and yield increasingly poor and few blossoms. It is practically impossible to force such plants to increased activity by heavy applications of fertilizers. The foliage of plants affected with this disease is frequently of a lighter green color than that of healthy plants. Probably the number of plants actually killed within the duration of time they are usually kept by growers is very small, but the normal activities of the plant are so materially interfered with that diseased plants can be grown only at a financial loss.

Cause. Crown-canker of the rose is caused by the fungus *Cylindrocladium scoparium.* This organism was first reported from Ohio where it was found growing saprophytically on a pod of the honey-locust. Later it was found living on dead paw-paw leaves. The writer described the fungus as a parasite on the rose in December, 1917.

Although spores of the fungus have never been found by the writer on plants growing in the benches, they frequently develop in from two to five days on diseased rose plants when kept in a moist chamber. Consequently they are probably formed in the greenhouse on plants growing under moist conditions. Spores placed in water germinated after three to twelve hours. They are thin walled and probably not long lived. Just what part they play in disseminating the fungus is unknown. Infection of plants is readily obtained by spraying them with water containing viable spores in suspension.

Moisture Relation.

Moisture apparently plays an important rôle in the severity of the disease. Lesions on stems well above the surface of the soil resulting from artificial inoculations appear to dry and make no further progress unless kept moist by being surrounded with wet cotton or some such substance. Inoculations made at a point several inches above the soil frequently result as above. One grower who has had considerable experience with crown-canker is of the opinion that the disease is lessened by placing plants with the graft union above the soil, thereby preventing infection at this point. The same grower stated that the seriousness of the disease is reduced by pulling the soil away from the crown of the plant, thus creating a more dry condition at this point. These are undesirable methods, for grafted plants usually develop roots at the graft union when planted sufficiently deep. It is the opinion of the writer that the fungus is low in parasitism and that conditions of moisture are important factors in its development.

Control. Although experiments are under way in the hope of developing some method of controlling the crown-canker of rose no definite results are yet at hand. From the nature of the fungus

and judging from results to date it would seem that control will resolve itself into some method of soil treatment, probably soil sterilization. The fungus grows well on both acid and alkalin media so that the possibility of control by developing an acid or alkalin condition of the soil does not appear to be promising. Soil sterilization and the exercise of care in using only healthy stock and scions for grafting may be the only feasible method of controlling the disease. Investigations of control measures are being conducted in cooperation with Professors A. V. Osmun and P. J. Anderson of the Massachusetts Agricultural Experiment Station. Progress to date has been encouraging and it is hoped that something definite can be offered growers in the near future.

Crown-Gall.

This is a very common disease of the rose, both of plants grown under glass and out-of-doors. It is the common crown-gall disease of the nursery, affecting many woody plants, trees, and shrubs, as well as herbaceous plants. Roses in benches are frequently severely affected. Much interest in recent years has been attached to the study of this disease because of its resemblance to malignant human tumors, with the possibility that light may be thrown upon the latter.

History and distribution. The disease has been known in Europe for over fifty years, being generally ascribed to frosts and mechanical injuries by many workers. According to Smith, Townsend and Brown (14), Scalia described a tumor occurring an old stems of the rose near the surface of the earth, but also frequently higher up. It is impossible to be quite certain that the disease described by Scalia is identical with the crown-gall of the rose as it occurs in this country.

In the United States references to the disease in literature begin about the year 1892, but undoubtedly the disease has been present for a long time. It has been reported as occurring in all the states.

Economic importance. Opinions differ as to just how much damage this disease causes to roses. Skilled gardeners are generally of the opinion that serious injury is done, diseased plants being

smaller and bearing less foliage and less vigorous flowers. It seems obvious that the energy used up in the production of galls, which are often large, must be at the expense of the general needs of the plant, resulting in an inferior product.

Symptoms. Crown-gall exhibits itself in the production of galls or tubercles, usually on the roots or the crowns of the plants, but not infrequently on parts of the plant above ground. Smaller and younger galls range in color from green to white and are soft and spongy. As the galls become older they increase in size, frequently reaching a diameter of several inches and darken in color externally. The surface is rough, sometimes convoluted, and usually the galls become firm and hard with age.

Etiology.

Crown-gall is a bacterial disease caused by *Bacterium tumefaciens* Sm. and Town.

The greater number of European observers assigned the cause of the disease to physical agents, such as late frosts and winter killing. Others thought the disease might be brought about by injuries received from insects, while still others believed that the disease was caused by bacteria, fungi, or slime-moulds, although the pathogenicity of none of the suspected organisms was established.

In April, 1907, Smith and Townsend (15) described a plant tumor of bacterial origin, giving conclusive proof of the pathogenicity of the organism *Bacterium tumefaciens* which was isolated from the galls of the Paris daisy. Galls were produced on tobacco, tomato, potato, sugar-beet, hop, and peach by artificial inoculation.

In December, 1908, at a meeting of the Botanical Society of America, Townsend (16) reported the results of further experiments with the organism from the Paris daisy. A bacterium was isolated from a gall on roses and other plants which appeared to be identical with that isolated from the daisy. The organisms from the different hosts were cross-inoculable. Smith, Townsend and Brown (14) report successful infections on the rose with the pathogene isolated from galls on this and other plants, and records

experiments tending to show a wide range of natural cross-inoculability.

Life History. It is probable that the bacteria causing crown-gall must enter the plant through wounds. The development of certain cells in the host plant is stimulated resulting in the formation of large galls. The size of the tumors, other things being equal, depends on how rapidly the plants are growing. The galled tissue is often of a soft fleshy nature and is much subject to decay. Tumor strands develop into the normal tissue as roots of the tumor, in the substance of which secondary tumors arise. These secondary tumors rupture their way to the surface.

The bacterium is a soil organism, probably being able to live in the soil for years without losing its virulence. Its entrance into the host is favored by careless grafting and by the presence of borers, nematodes, and the like.

Control. Since *B. tumefaciens* is a soil organism, growers should plan to keep their soil free from it by planting only healthy stock. All plants should be carefully inspected for galls before they are set in the benches. It is advisable to burn all cuttings showing galls. Do not plant healthy plants in soil in which diseased plants have grown. Infested soil should be sterilized by steam or replaced by soil in which no diseased plants have grown. When infested soil is removed from the greenhouse the benches should be thoroughly disinfected. The removal of galls from plants is of doubtful value. Once a plant is affected no treatment will cure it.

Bibliography.

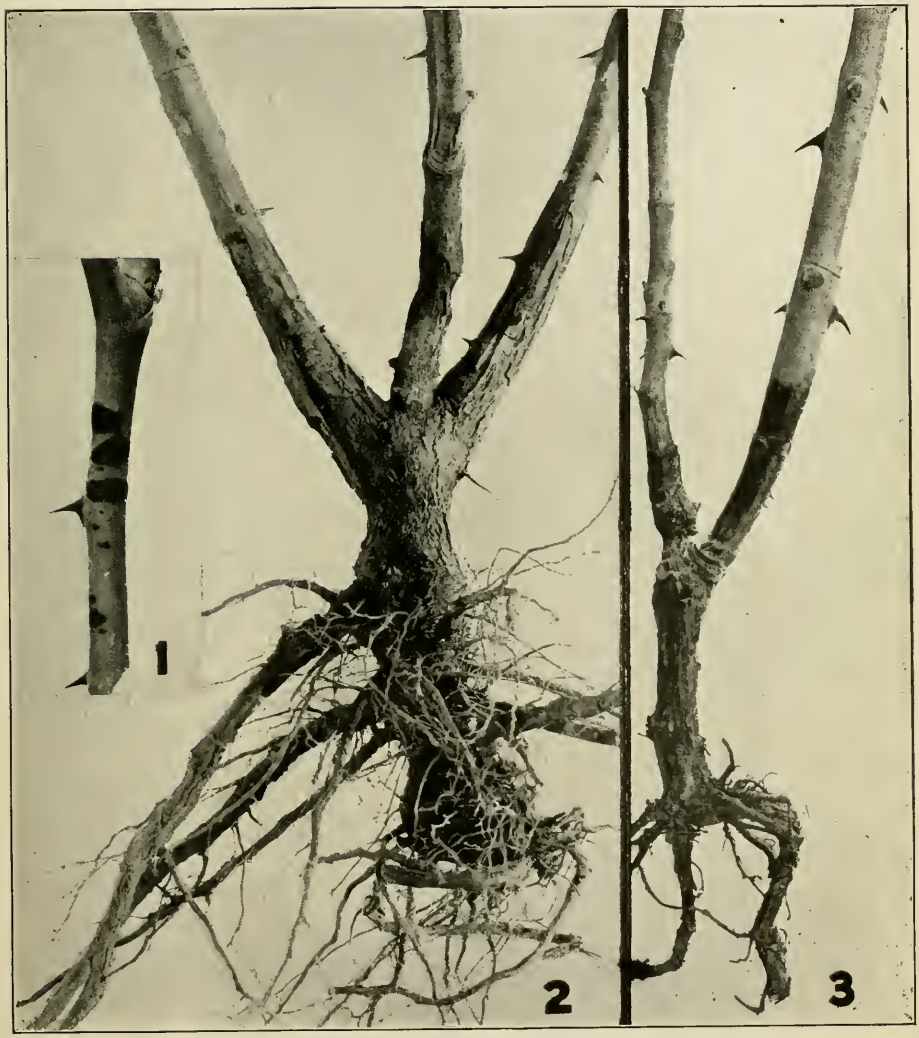
1. Laubert, R., and Schwarz, M. Rosenkrankheiten und Rosenfeinde, pp. I–VI + 59. 1910.
2. Scribner, F. L. Black spot of rose leaves. U. S. Dept. Agr. Report **1887**: 366–369. 1888.
3. Maynard, S. T. Rose leaf blight (Actinonema rosæ). Mass. Agr. Exp. Sta. Bul. **4**: 10. 1889.
4. Humphrey, J. E. The black spot of rose leaves. Mass Agr. Exp. Sta. Bul. **6**: 13–15. 1889.
5. Wolf. F. A. The perfect stage of Actinonema rosæ. Bot. Gaz. **54**: 218–234. 1912.

6. Wolf, F. A. The perfect stage of the rose Actinonema. Science N. S. **35**: 152. 1912.
7. Salmon, E. S. Sphærotheca pannosa (Wallr.) Lév. *In* A Monograph of the Erysiphaceæ. Mem. Torr. Bot. Club **9**: 65–70. 1900.
8. Stewart, F. C. Powdery mildew. *In* Notes on New York Plant Diseases, I. New York (Geneva) Agr. Exp. Sta. Bul. **328**: 390–391. 1910.
9. Woronichin, N. N. Bul. Trimest. Soc. France **30**: 391–401. 1914.
10. Norton, J. B. S., and White, T. H. Rose mildew. Maryland Agr. Exp. Station. Bul. **156**: 73–80. 1911.
11. Stewart, V. B. Experiment for the control of rose mildew. *In* Dusting nursery stock for the control of leaf diseases. New York (Cornell) Agr. Exp. Sta. Circ. **32**: 9. 1916.
12. Maynard, S. T. Treatment of mildews upon plants under glass. Jour. Mycol. **6**: 16–17. 1891.
13. Massey, L. M. The crown-canker disease of rose. Phytopath. **7**: 408–417. 1917.
14. Smith, E. F., Brown, N. A., and Townsend, C. O. Crown-gall of plants: its cause and remedy. U. S. Dept. Agr., Bur. Plant Indus. Bul. **213**: 1–200. 1911.
15. Smith, E. F., and Townsend, C. O. A plant tumor of bacterial origin. Science, N. S. **25**: 671–673. 1907.
16. Townsend, C. O. A bacterial gall of the daisy and its relation to gall formations on other plants. Science N. S. **29**: 273. 1909.

Explanation of Plates.

Plate 1. Rose plants affected with crown-canker. Fig. 1. Stem of an Ophelia plant artificially inoculated with mycelium of fungus. Fig. 2. Hoosier Beauty plant showing cracking at crown. Fig. 3. American Beauty plant showing black water-soaked area at crown. Figs. 1 and 2, natural size; Fig. 3, three-fourths natural size.

Plate 2. Fig. 1. Plant affected with crown-gall. Note the large gall formed at the crown of the plant. Fig. 2. Black-spot lesions on rose leaf. Natural size.



MASSEY—DISEASES OF ROSES

MASSEY—DISEASES OF ROSES

TRANSACTIONS

OF THE

Massachusetts Horticultural Society

FOR THE YEAR 1918

PART II

BOSTON
PRINTED FOR THE SOCIETY
NINETEEN HUNDRED AND NINETEEN

Massachusetts Horticultural Society.

1918.

The Transactions of the Society are issued annually in two parts under the direction of the Committee on Lectures and Publications.

Communications relating to the objects of the Society, its publications, exhibitions, and membership, may be addressed to William P. Rich, Secretary, Horticultural Hall, No. 300 Massachusetts Avenue, Boston, Massachusetts.

Fred A. Wilson, *Chairman*	*Committee on*
Thomas Allen	*Lectures and*
John K. M. L. Farquhar	*Publications.*

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TRANSACTIONS

OF THE

Massachusetts Horticultural Society.

1918, PART II.

REPORT OF THE BOARD OF TRUSTEES FOR THE YEAR 1918.

The Board of Trustees of the Massachusetts Horticultural Society presents herewith to the members a summary of the business transacted at its meetings during the year 1918.

January 12. Walter Hunnewell was appointed Treasurer of the Society and William P. Rich Secretary, Librarian, and Superintendent of the Building for the current year. James Wheeler was appointed Superintendent of Exhibitions for the year with a salary of $300.

An appropriation of $500, to include the income of the John Lewis Russell Fund, was voted for the lecture course of the year 1919.

Concerning the appropriation for prizes and gratuities for the year 1919 it was voted to refer the matter to the Advisory Committee with instruction to refer back to the Board.

The suggestion was made that the amount carried on the Treasurer's books under the heading of furniture and exhibition ware and all other accounts of fixtures and library be referred to the Advisory Committee for such action as may be desirable.

The special committee on the award of the George Robert White Medal of Honor for the year 1917, consisting of Messrs. Sargent, Farquhar, and Roland, reported the name of Professor Niels Ebbesen Hansen of Brookings, South Dakota. Mr. Far-

quhar stated that the award was recommended in recognition of the important service rendered by Professor Hansen in the introduction and hybridization of new varieties of economic plants and fruits suitable for cultivation in the northwestern states. It was voted to accept the report of this committee.

The following named persons, recommended by Professor Sargent, were duly elected to Corresponding Membership in the Society:

Isaac Bayley Balfour, Regius Keeper, Royal Botanic Garden, Edinburgh, Scotland.
Desiré Bois, Editor Revue Horticole, Paris, France.
Léon Chenault, Orléans, France.
William C. Egan, Highland Park, Illinois.
Bertrand H. Farr, Wyomissing, Pennsylvania.
Professor Niels Ebbesen Hansen, Brookings, South Dakota.
Charles L. Hutchinson, Chicago, Illinois.
Mrs. Francis King, Alma, Michigan.
J. Horace McFarland, Harrisburg, Pennsylvania.
Doctor George T. Moore, Director Missouri Botanical Garden, Saint Louis, Missouri.
Doctor Walter Van Fleet, Bureau of Plant Industry, Washington, D. C.
F. Gomer Waterer, Bagshot, Surrey, England.

January 18. On call of the President a special meeting of the Board of Trustees was held this day.

The President stated that some adverse criticism had been made recently because of the action of the Society in eliminating the money prizes from the Schedule of Prizes and Exhibitions for the year 1918 which had culminated in a communication from the Gardeners' and Florists' Club of Boston requesting that a special meeting of the Society be called to consider the desirability of eliminating the money prizes for the year 1918.

After a general discussion of the subject it was voted to approve the decision of the Advisory Committee in omitting the money prizes for the year.

In regard to the communication from the Gardeners' and Florists' Club it was voted to appoint a committee consisting of Messrs.

Saltonstall, Endicott, Farquhar, Roland, and James Wheeler to confer with a committee of the Gardeners' and Florists' Club in an effort to harmonize the differences of opinion on the subject of prizes.

It was further voted to allow the income of the special prize funds of the Society, which is required to be expended annually, to be included in the Schedule of Prizes for the year 1918.

June 27. Communications from the recently elected Corresponding Members were read accepting with appreciation the honor conferred upon them.

The President presented the report of the Advisory Committee on the Schedule of Prizes and Exhibitions for the year 1919.

He stated that the committee recommended the elimination of all flower shows for the year on account of war conditions, the coal situation, and the closing of many greenhouses, and to concentrate the work of the Society in the interest of vegetable growing and increased food production.

Mr. Kidder suggested that members and others be invited to send in exhibits of plants and flowers without prizes and that culinary herbs and medicinal plants be included in the Schedule.

The Committee recommended the following outline of exhibits and appropriations for the year 1919:

For exhibition of the products of children's gardens, $250.

For children's gardens within ten miles of the State House, $250.

For amateur home vegetable gardens within ten miles of the State House, $250.

For exhibition of the products of amateur home vegetable gardens, $250.

For a fruit and vegetable exhibition in September, $1000 for vegetables, $500 for fruits, and $300 for outdoor grown flowers.

It was voted to approve the general plan as outlined in the report, with the omission of the $300 for outdoor grown flowers, and an appropriation not exceeding $3500 was voted for the 1919 Schedule, to include the income of such special prize funds as may be applicable therefor.

The special committee on the annual award of the George Robert White Medal of Honor, consisting of Messrs. Sargent, Farquhar, and Roland, presented the name of Doctor Walter Van Fleet of Washington, D. C. The committee stated that the nomination of Doctor Van Fleet was in recognition of his service in horticulture, especially his work in the hybridization of the rose. Among his productions of roses are the American Pillar, Dr. Van Fleet, and Silver Moon.

The report of the committee was accepted and it was voted to award the George Robert White Medal of Honor for the year 1918 to Doctor Walter Van Fleet.

The President called attention to the amount of $48,000 carried on the Treasurer's books as surplus, the result of the accumulation of previous years. Although already safely invested and practically principal he said it should not longer be carried as surplus and he recommended that all of this amount, with the exception of $2500, be carried to capital account.

The Treasurer, Mr. Hunnewell, replied that he could not agree with the President in this application of the surplus income account. On motion of Professor Sargent it was voted to refer the matter with power to the Finance Committee, with the addition of Messrs. Dane, Moseley, and the President.

In accordance with the provisions of the By-laws of the Society the following amendment to Section IX. Clause (7) was recommended and ordered to be presented for adoption at the next annual meeting of the Society in November.

Voted.— That Section IX. Clause (7) be amended so that it shall read:

(7) They shall arrange for such exhibitions of flowers, plants, fruits, and vegetables in each year as they may deem desirable and shall have the entire charge of all arrangements for conducting the same. They may also adopt such other methods for promoting the interest in horticulture as they may deem advisable.

On the recommendation of the Advisory Committee an appropriation not exceeding $1000 was voted for home garden instruction during the current year and for the employment of a professional gardener from May to August inclusive.

William P. Rich,
Secretary.

REPORT OF THE COMMITTEE ON PRIZES AND EXHIBITIONS FOR THE YEAR 1918.

By James Wheeler, Chairman.

The exhibitions of the past year have not been as large as usual nor as well attended, owing to war conditions, the scarcity of labor, and the elimination of money prizes; and consequently did not come up to our hopes and expectations.

At the Spring Show in March no prizes were offered but the exhibition proved a great success. The growers and exhibitors responded handsomely as the receipts were for the benefit of the American Red Cross.

Prizes were offered at the Sweet Pea Show for amateurs and also at the Gladiolus Show resulting in a good competition at both shows. All the other shows proved beyond doubt that we cannot keep up the high standard of our exhibitions without offering prizes.

The Board of Trustees has made an appropriation of $3500 for the year 1919 and the Schedule of Prizes has been made up by your committee and approved by the Trustees.

James Wheeler
Robert Cameron
William N. Craig
Duncan Finlayson
T. D. Hatfield

Committee on Prizes and Exhibitions.

REPORT OF THE COMMITTEE ON PLANTS AND FLOWERS FOR THE YEAR 1918.

By William Anderson, Chairman.

The shows of the Society the past year with the exception of the March Exhibition were below the average. The high cost of labor and general war conditions and the fact that the Society offered practically no inducements to growers were responsible for this condition.

On January 30 the Carnation Exhibition was held in conjunction with the Annual Meeting of the American Carnation Society. There were no carnations exhibited under the schedule of the Horticultural Society. Dailledouze Brothers, New York, was awarded a Certificate of Merit for rose Ophelia Supreme, Carl Hagenburger, West Mentor, Ohio, received a Silver Medal for *Solanum Capsicastrum* Orange Queen and a Certificate of Merit for *Solanum Capsicastrum* Cleveland, a dwarf, red-fruited variety.

Spring Exhibition.

The Spring Exhibition which opened March 13 was a success in every way. For harmony of arrangement and quality of material shown it equaled any show held in Boston in recent years. First in importance was the exhibit of acacias from Thomas Roland which included twenty-eight species and filled the Lecture Hall. A Gold Medal was awarded Mr. Roland for his magnificent display.

Ernest B. Dane had a well arranged group of orchids. It contained many well-grown and valuable plants among which were Odontioda Bradshawiae, Odontoglossum Queen Alexandra, Cypripediums Minos Youngii and Bingleyense, Cattleyas Louis Sander and Rheims, and some fine Laelio-Cattleya hybrids. A Gold Medal was awarded Mr. Dane for his exhibit.

Albert C. Burrage of Prides Crossing was also awarded a Gold

Medal for a splendid group of orchids which contained many choice specimens; among them were Brasso-Cattleya Heatonensis, Cattleyas Trianae A. C. Burrage, Snowflake, and Luminosa, Odontoglossum amabile, Cypripedium Archie Neil, and Oncidium Cavendishianum.

Silver Medals were awarded to the following named exhibitors of artistic groups of foliage and flowering plants: Mrs. C. G. Weld (Wm. C. Rust, gardener) who had the most artistically arranged group; Edwin S. Webster (Peter Arnott, gardener); Miss Cornelia Warren (Henry Stewart, gardener); Weld Garden (Duncan Finlayson, gardener); Edward A. Clark (W. H. Golby, gardener); and the W. W. Edgar Company.

Prof. C. S. Sargent (Charles Sander, gardener) exhibited a splendid group of *Clivia miniata* which included some very fine varieties raised from seed by Mr. Sander. A Silver Medal was awarded Mr. Sander. The same exhibitor also put up a collection of small-flowered azaleas, hybrids between *Azalea Hinodigeri* and *A. romantiaca.*

A. W. Preston (John L. Smith, gardener) and H. T. Hayward (James Warr, gardener) were the principal exhibitors of bulbous plants. Mr. Preston had the best group and Mr. Hayward was awarded numerous First Prizes for his exhibits of tulips and narcissi, and for an exhibit of splendidly-grown mignonette in pots he was awarded a Cultural Certificate.

F. W. Fletcher was awarded a Cultural Certificate for his newest hybrids in colored freesias, George Page a Cultural Certificate for a fine exhibit of spring-flowering plants, and Peter Arnott the same for cyclamens. There were also fine cyclamens from Mrs. J. L. Gardner and Mrs. Lester Leland, the latter being awarded a Silver Medal for her exhibit. R. & J. Farquhar & Co. arranged a Liberty Garden in the Main Hall which was much admired, masses of the *Lilium regale, Azalea Kaempferi,* and other flowering plants being effectively used.

The Boston retail florists were well represented with baskets, vases, and other tasteful arrangements of flowers and plants. Silver Medals were awarded the following firms: Penn the Florist, Boston Cut Flower Co., Henry R. Comley, Caplan the Florist, Zinn the Florist, and John J. O'Brien. There were some beauti-

ful exhibits of carnations, notably that of S. J. Goddard. About thirty varieties of camellias were exhibited by Mrs. Bayard Thayer, Mrs. Sarah C. Sears, and W. R. Coe, the best of which were the varieties Mrs. F. Sander, Lady Roberts, Eileen, Sylva, and Frau Bertha Seidel. R. & J. Farquhar & Co. was awarded Honorable Mention for a new hardy azalea, the result of a cross between *Azalea Kaempferi* and *A. ledifolia.*

May Exhibition.

On May 18 *Calceolaria Stewartii*; pelargoniums, lilacs, and tulips were on exhibition. P. J. Daly, gardener to L. D. Towle, received a First Class Certificate for *Laelio-Cattleya Dominiana langleyensis.*

Peony and Rose Exhibition.

The annual exhibition of peonies and roses was held June 15 and 16 and was well up to the usual high standard. T. C. Thurlow's Sons were the largest exhibitors, filling nearly half of the Main Hall. They were awarded the American Peony Society's Medal for the largest and best collection. They were also the principal prize winners in the other large classes.

Silver Medals were awarded J. K. Alexander for a fine display of flowers, T. C. Thurlow's Sons for their extensive display, and George N. Smith for his fine exhibit of specimen blooms. R. & J. Farquhar & Co. was awarded a Silver Medal for a display of peonies and roses. This firm also exhibited the new, large, pure white double peony Mrs. Bayard Thayer, which won First Prize for the best bloom in the show and in addition a Certificate of Merit. Some of the finest varieties shown were Venus, M. Dupont, Mr. Manning, Germaine Bigot, M. Jules Dessert, Mme. Boulanger, James Kelway, Frances Willard, Archie Brand, Sarah Bernhardt, and Avalanche.

John B. Wills, Wm. C. Winter, and A. L. Stephen were the principal exhibitors of roses. Some of the best varieties were George Arends, Jonkheer, J. L. Mock, Edward Mawley, Mme. Mélani Soupert, Mrs. David McKee, Florence Pemberton, Mme. Caroline Testout, George Dickson, Dean Hole, and Liberty.

Mrs. C. G. Weld (Wm. C. Rust, gardener) received a Silver Medal for a display of Hybrid Perpetual roses; Thomas N. Cook, a First Class Certificate for a new rambler Ghislaine de Feligonde; Miss Cornelia Warren (Henry Stewart, gardener) a Silver Medal for a well-flowered group of *Oncidium flexuosum;* A. W. Preston (John L. Smith, gardener) a Silver Medal for the splendid, pure white Cattleya Charm, a cross between *C. Gaskelliana alba* and *C. Mossiae Wageneri.* The same exhibitor received a similar award for the new Laelio-Cattleya Rheims alba rubra, a cross between *Laelia purpurata* and *Cattleya exoniensis.* The Boston Cut Flower Co., Houghton-Gorney Co., and Henry R. Comley exhibited handsome vases and baskets of cut flowers.

Sweet Pea Exhibition.

The Sweet Pea Show was held July 6. There was practically no competition. W. G. Taylor of Newport, R. I., had some good blooms of the following: Constance Hinton, King Edward, Hercules, Margaret Atlee, A. F. Felton, King Marvel, M. J. Dameron, and Rosabelle. The Blue Hill Nurseries was awarded a First Class Certificate for a pure white *Delphinium Belladonna.*

Gladiolus Exhibition.

The Gladiolus Show, held August 10 and 11, was not large but the quality of the flowers was very fine. Thomas Cogger was awarded a Silver Medal for a fine vase of Miss Helen Franklin, a new ruffled variety, clear white, with violet stripes on the lower petals. S. E. Spencer was awarded a Silver Medal for a display of beautiful varieties. Bronze Medals were awarded Jelle Roos and C. W. Brown for displays of gladioli and Honorable Mention to George N. Smith for herbaceous phlox. Some fine seedlings of gladioli were shown, the best of which was a very large Scarlet from H. E. Meader. Prominent among the varieties shown were Panama, Baron Hulot, Goliath, Ida Van, Schwaben, Byron L. Smith, America, Ophir, Purple Glory, Mrs. Dr. Norton, Nymph, Golden Measure, Peace, Mrs. Francis King, Red Amaryllis, and

Mrs. G. W. Moulton. There was an extensive display of the Lily White, said to be a good forcing variety.

August 31 Albert C. Burrage of Beverly Farms (Douglas Eccleston, gardener) exhibited two rare orchids. They were *Vanda luzonica,* the first ever shown in the hall, and *Cattleya Fabia.* Each was awarded a Silver Medal.

Dahlia Exhibition.

The Dahlia Exhibition was held September 14 and 15. Although the season was very favorable for dahlias the show was disappointing. The largest exhibitor was J. K. Alexander of East Bridgewater. The Fottler Fiske Rawson Co. exhibited dahlias and gladioli; the Ames Plow Co. also had a display of dahlias; the Boston Cut Flower Co. was first for the largest and best display, well arranged in vases and baskets, and W. D. Hathaway, second; A. M. Hayden of Brockton was first for twelve Decorative dahlias; G. L. Stillman of Westerly, R. I., first for Peony Flowered.

For the best seedling J. E. Jones was first with President Wilson, a large, well-shaped flower of the Decorative type, rose-crimson in color, with white stripes on the end of the petals. Among the best varieties shown were the Decorative: Pink Lady, Glory of New Haven, Dr. Tevis, Mrs. Addison Pratt, Bradford, Cecil, and C. W. Hayden; Peony Flowered: Muncie D. Foster, W. G. Brown, General Cadorna, Lady Gay, and Dixie.

Autumn Exhibition.

At the Autumn Exhibition, November 6 and 7, a Certificate of Merit was awarded Miss F. P. Mason for chrysanthemum Monadnock, a fine yellow Anemone, and Nashawtuc, a large yellow Japanese. F. Dorner & Sons Co. was awarded a Silver Medal for carnation Endurance, a fine light pink, and Honorable Mention for carnation No. 167.

Albert C. Burrage was awarded a Silver Medal for a tastefully arranged group of orchids and a similar award was given to Joseph A. Manda for a display of *Cypripedium insigne Sanderae.* Edwin

S. Webster exhibited a new winter-flowering begonia, the Exquisite, and received a Silver Medal. He won a similar award for a table of begonias which included specimens of Optima, Moonbeam, Elatior, Fireflame, and Rosalind.

WILLIAM ANDERSON
ARTHUR H. FEWKES
S. J. GODDARD
DONALD MCKENZIE
WILLIAM SIM

Committee on Plants and Flowers.

REPORT OF THE COMMITTEE ON FRUITS FOR THE YEAR 1918.

By Edward B. Wilder, Chairman.

Your committee is obliged to report a very disappointing year's work. The displays of fruit have been meager, owing largely to the almost complete elimination of money prizes from the Schedule. The growers of fruit faced a hard year under war conditions, shortage of labor, and poor transportation, and needed an added encouragement and inspiration to help them to grow and exhibit the best fruit possible.

With the Food Administration urging the use of more fruit this Society should have been the pioneer in launching out into new fields of endeavor and reaching forth to the future. The number of prizes awarded this year amount to 52, nine of which are money prizes as compared with 294 money prizes awarded for fruit in 1917.

At the Rose, Peony, and Strawberry Exhibition, June 15–16, a Silver Medal was awarded Louis Graton of Whitman for the best new strawberry of merit not yet introduced. He has named this berry "Louella" and speaks of it as follows:

"The Louella has now fruited three consecutive seasons. It was found in a row of Brandywines, so I am sure of one of its parents. It begins fruiting two or three days later than the Brandywine, holds its size throughout the season, and also has its hull bright and green to the last picking. It is a little darker than its parent and is a rich red clear through. The blossoms are perfect and the berry is regular in form, very uniform in size, and excellent in flavor."

Great credit is due Hillcrest Farm, Weston, Miss Marian R. Case, proprietor, for her many exhibits of fruit during the year.

At the Sweet Pea Exhibition, July 6–7, she took six First Prizes and one Second Prize, five of these being for raspberries, the largest

display that has been seen in the Hall for years. Honorable Mention was also awarded her at the Gladiolus and Phlox Exhibition, August 10–11, for the Japanese wineberry.

A new raspberry called "La France" was displayed at the Dahlia, Fruit, and Vegetable Exhibition, September 14–15, by the John Scheepers Co., of New York. It seems to be a promising late variety, a strong grower, and very productive.

Mrs. R. Goodnough of West Roxbury exhibited a beautiful basket of Eaton grapes at the Autumn Exhibition, November 6–10, for which she received Honorable Mention.

EDWARD B. WILDER
WILLIAM N. CRAIG
ISAAC H. LOCKE
JAMES METHVEN
} *Committee on Fruits.*

REPORT OF THE COMMITTEE ON VEGETABLES FOR THE YEAR 1918.

By John L. Smith, Chairman.

The results of the vegetable exhibitions for the year 1918 have been less satisfactory than in former years. This was due largely to the scarcity of labor caused by conditions resulting from the war. Quantity of production has been emphasized rather than quality because the needs of the country have been so pressing.

It is only when the people are free from stress that they devote their time to the improvement of the quality of an article. At such times there is ample labor available, plenty of time, and the people are psychologically in a condition to give their attention to the production of goods from the standpoint of excellence. During the past year, however, the result sought for was an increase in production, and we are sure this has been accomplished.

Efforts have been made to stimulate the people to raise vegetables sufficient for their own needs, and much work of a very encouraging nature has been done in this direction. If persons who have become interested during the past year will persevere, a little later they will see their efforts rewarded, and will then desire to give more attention to improving the quality of their products.

Exhibitions during the past year have been poorly attended, and for reasons indicated above the competition has been poor. The attention of the exhibitors was absorbed in other matters. They were interested in winning the war and had little time for attending exhibitions of any kind.

During the year, demonstrations were given at Horticultural Hall by experts in the matter of planting and growing vegetables. There was much interest in this new plan. It gave a great deal of expert knowledge to those who were anxious to learn and desirous of putting their knowledge into practice. This is a plan that we recommend and sincerely hope will be continued.

The war is now over, but we should not cease our efforts to increase productivity of the soil. Education is necessary and should be continued.

We realize that, in a crisis similar to the one through which the world has just passed, the raising of food is a great essential. While there may be relaxation upon the part of many, it is to be hoped that interest in agriculture will be kept active so that the Nation will always have in reserve, so to speak, an army of men, and women, if necessary, who can intelligently plant and grow crops.

In closing, we desire to call your attention to the many young men who left their employment in greenhouses, gardens, and farms to enter the war. These young men are now returning and should be received back by their former employers. This is not only a duty that is owed these young men because of the sacrifices they have made, but, likewise, one that we owe the Nation as a whole. It is a form of patriotic service, and will come back to us many fold in future years.

JOHN L. SMITH
EDWARD PARKER
WM. C. RUST
Committee on Vegetables.

REPORT OF THE COMMITTEE ON CHILDREN'S GARDENS.

By Henry Saxton Adams, Chairman.

The exhibition of the products of the children's gardens was held at Horticultural Hall on Saturday and Sunday, August 31 and September 1, 1918, and filled all three halls. There was not quite as much material brought in as in 1917, due probably to the fact that much of the product raised in the gardens was used as food or for canning and drying purposes. Our prizes were also reduced which undoubtedly prevented a number, outside gardens particularly, being represented.

We noted a decrease in the number of exhibits of flowers, showing that children's gardens were given up more than ever to the production of vegetables for food. The exhibits were fully up to the standard of the last few exhibitions and in some cases better than ever. There is no question but that the quality of the exhibits of the children in many cases equals those of adults at the regular shows. There were entries in all of the classes in which prizes were offered except wild flowers, and here again we seemed to feel the effects of war conditions. In some of the exhibits of vegetables there was an unusually large number of exhibits; for instance, there were one hundred entries of six specimens of tomatoes for which ten prizes were offered and awarded; there were sixty-five entries of potatoes; fifty-eight of carrots; forty-four of beets; forty-two of green string beans; and thirty-six of green sweet corn. In the class of any variety of vegetable not mentioned in the list we had eighty-two exhibits with only six prizes offered.

Among the interesting garden exhibits was one from the War Garden on Boston Common which we think is rather unusual and particularly noteworthy as an exhibition of vegetables grown by children on Boston Common. The appropriation for prizes was entirely used and it gives us pleasure to announce that for the season of 1919, with the coöperation of the State Department of

Agriculture, we will have a larger appropriation and consequently will be able to offer better prizes in the classes where the small prize did not attract exhibitors. We have also made other changes in our schedule which we feel sure will increase the interest among the children and improve the exhibition.

There were one hundred and eighty prizes offered at this exhibition of which one hundred and seventy-eight were awarded ranging from five dollars to twenty-five cents.

HENRY SAXTON ADAMS
DR. HARRIS KENNEDY
MRS. W. RODMAN PEABODY
MISS MARGARET A. RAND
JAMES WHEELER

Committee on Children's Gardens.

REPORT OF THE DELEGATE TO THE STATE BOARD OF AGRICULTURE FOR THE YEAR 1918.

By Samuel J. Goddard, Delegate.

The passage of the Anti-Aid Amendment to the Massachusetts Constitution severed the relations which had existed for many years between the Board and this Society. This amendment provided that no State funds could be given to any private corporation, so that the State bounty received in August, 1918, was the last bounty of this sort that the Horticultural Society will receive. As membership on the Board was dependent on receiving bounty, it was evident that some reorganization of the Board was necessary. The Legislature of 1918 therefore created a new State Department of Agriculture, consisting of one member from each county, to be appointed by the Governor. This Department came into existence on the first of September, and the term of office of your delegate on the Board expired on that date.

One of the most important pieces of work with which the Board has had to deal during the last year and one which closely affects horticultural interests, especially the market gardener, is the European Corn Borer. This pest is a new importation, which appeared in Eastern Massachusetts and is now prevalent in thirty towns in the immediate vicinity of Boston. It attacks not only corn, but garden vegetables, flowers and weeds, and is very destructive. The leading entomologists say that if allowed to get out of control it will be the worst insect pest that has ever come to this country. Strenuous efforts are being made by the State Board and its successor, the State Department, to stamp out this pest, and in this work it is coöperating with the Bureau of Plant Industry of the United States Department of Agriculture. As the insect hibernates in weeds, corn stalks and various kinds of garden refuse, the most practical way to attack it is to entirely clean up gardens in the fall and burn the refuse, including particularly all corn stalks and weeds. The Department is making an

effort to have every garden in the infested area cleaned up, and of course this is a tremendous task and probably cannot all be done this winter. Representations are being made to the Federal Congress for a large appropriation to work with in Massachusetts for next year, as it is felt that this pest must be stamped out here and now. If it is once allowed to get away and into the great corn belt it will be useless to attempt to eradicate it. This work is being carried on under the direct supervision of the State Nursery Inspector.

During the past year Dr. Burton N. Gates, formerly State Apiary Inspector, has resigned and gone to Canada as provincial apiarist for the Province of Ontario. Dr. Gates' work among the beekeepers in this State is well known, and his work has been very beneficial to the horticultural interests. So far his place has not been filled.

The new Department of Agriculture has elected Wilfrid Wheeler of Concord as Commissioner of Agriculture for a term of three years. Mr. Wheeler was for five years Secretary of the old State Board of Agriculture, and before that was delegate from the Massachusetts Horticultural Society to the Board.

During the year three conferences were held of representatives from all the New England States to draft a uniform apple grading law for the six states. Five of these states now have such laws, Rhode Island being the only one which has not. The laws, however, differ in important particulars, and as Boston is the principal market for the six states, it has been felt that it would be of great advantage to the fruit growing interests if the laws could be the same. An interstate committee, of which Mr. Wilfrid Wheeler was chairman, has finally worked out a law which has met with the approval of all the fruit growing bodies of these states, and this will be introduced at the coming session of the Legislature.

The State Board of Agriculture carried on an important emergency piece of work during the past year, in the operation of State farm machinery. An appropriation of $100,000 was made, to be used in the purchase of farm machinery in order to increase food production. This money was used in the purchase of thirty-six tractors, twelve binders, ten threshing machines, two bean threshers and a hay baler. The machinery was distributed in parts of the

State where the need for it seemed to be most pressing, and was operated by the State, the cost of the work in each case being charged to the farmer. In addition to the large increased acreage which was put under cultivation, the experiment was a very valuable one as showing the place which the farm tractor has in Massachusetts. Five types of tractors were tried out, and the Department has reached very definite conclusions as to just what type of a farm the tractor will prove useful on. It is expected that now that the machinery has been purchased it will be operated another year, as the local demand for grain crops will probably be undiminished.

The Public Winter Meeting of the Board was held in Worcester in January, 1918, and the Summer Field Meeting was held at Hathorne at the Essex County Agricultural School in August.

The new Department will hold its First Annual Public Winter Meeting at Horticultural Hall in February, 1919.

REPORT OF THE SECRETARY AND LIBRARIAN FOR THE YEAR 1918.

The year 1918 has brought a break in the customary activities of the Society, particularly in its exhibitions. War conditions, the shortage of coal and consequent closing of many private greenhouses, have operated so unfavorably that with one or two exceptions the exhibitions have fallen far below the usual high standard of the Society. The elimination of money prizes from the Schedule has also had a discouraging effect upon the exhibitors.

These conditions, however, have been offset in large measure by the adoption of other methods for maintaining the usefulness of the Society.

The importance of an increased food production throughout the country was recognized early in the year and a plan was adopted by the Trustees to assist in this desirable work. It took the form of a course of practical instruction in vegetable gardening. A plot of earth was brought in to one of the halls and a professional gardener was engaged from May to August, inclusive, to give daily instruction in the best methods of planting seed, transplanting, fertilizing, control of insect pests, and other necessary information for successful vegetable growing. Special public meetings were held also on two evenings during the week when a number of expert gardeners, interested in the plan, contributed their services and their experience by presenting the best practical advice for obtaining results in the vegetable garden.

This course of instruction was freely offered to the public and the results were highly satisfactory and placed the Society in the line of usefulness to the Government in the trying days of the war. The success of this work suggests also the desirability of the Society engaging in further efforts in this direction, especially in the line of amateur home vegetable gardening.

In addition to this endeavor on the part of the Society to increase its usefulness the halls of its building were freely placed at the

disposal of the American Red Cross and other organizations for war relief work.

The Spring Exhibition in March was a notable success horticulturally as well as financially. The entire net proceeds of this show, amounting to $4500, were given to the Red Cross organization, which was in addition to several thousand dollars more taken in at the tea garden entertainment carried on by the ladies in connection with the flower show.

This exhibition and its object created a most favorable impression upon the public generally as a contribution which horticulture is making to relieve the disastrous conditions which necessarily follow as a result of the war.

The ever-recurring question of money prizes was brought to the front this year, resulting in a call by thirty-one members of the Society for a special meeting to protest the action of the Trustees in the matter. Both sides of the question were presented by its advocates and the action of the Trustees in eliminating money prizes for the year was approved by a large majority of the members present at the meeting.

Mention should be made of the annual exhibitions of the American Carnation Society in January and the American Dahlia Society in September which were held in connection with the scheduled exhibitions of the Massachusetts Horticultural Society.

The Carnation Society staged a magnificent display of carnations filling the large hall of the Society's building. The Dahlia Society put up its usual fine exhibit, containing numerous new varieties of this ever popular flower.

The exhibit of vegetables and canned products made at the September show by the Suffolk County Food Administration attracted enthusiastic interest.

These three special exhibits helped greatly to relieve the lack of interest in the other scheduled exhibitions.

The tenth award of the George Robert White Medal of Honor was made this year. The complete list of the recipients of this Medal is appended for permanent record:

1909. Professor Charles Sprague Sargent, Director of the Arnold Arboretum.

1910. Jackson Thornton Dawson, Superintendent of the Arnold Arboretum.
1911. Victor Lemoine, Horticulturist, Nancy, France.
1912. Michael H. Walsh, Rose Grower, Woods Hole, Mass.
1913. Park Commission of the City of Rochester, N. Y.
1914. Sir Harry James Veitch, Horticulturist, London, England.
1915. Ernest Henry Wilson, Horticultural Explorer in China.
1916. William Robinson, Horticultural Author, England.
1917. Niels Ebbesen Hansen, for Introduction of new economic plants, Brookings, South Dakota.
1918. Doctor Walter Van Fleet, for Advance in hybridization of garden plants, Washington, D. C.

The publications of the Society for the year have been as follows:

February 15. Schedule of Exhibitions for the year 1918, 44 pages.
May 11. Transactions, 1917, Part 2, pp. 111–212 and one plate.
July 27. Transactions, 1918, Part 1, pp. 1–101 and three plates.

The Library.

Part 1 of the new library catalogue, containing the alphabetical list of authors and titles, has been completed and a limited number of copies will be issued shortly. It has been deemed best to suspend temporarily the printing of Part 2, containing the classified arrangement of the books, the material for which has been prepared. It is intended later to issue the two parts in one volume.

The collection of horticultural trade catalogues has been increased by 160 additions, making the total number to this date 10,825.

William P. Rich,
Secretary and Librarian.

REPORT OF THE TREASURER FOR THE YEAR 1918.

Income.

Income from Interest on Investments and Bank Interest	$12,905 42	
" " Rents	2,608 69	
" " Exhibitions	398 90	
" " State Bounty	1,000 00	
" " Membership Fees	452 00	
" " Donations	308 90	
" " Sale of Lots in Mt. Auburn Cemetery	1,990 38	$19,664 29

Expense.

Operating Expense		$14,108 93	
Viz: Salaries	$4,413 92		
Insurance	510 25		
Heating	2,485 21		
Labor	2,693 05		
Incidentals	1,373 41		
Stationery and Printing	1,114 78		
Lighting	692 39		
Library Appropriation	289 90		
Postage $152, Repairs $384.02	536 02		
Prizes		420 50	
Viz: Plants and Flowers	211 00		
Children's Gardens	209 50		
Expenditures by Committees		1,510 02	
Viz: On Medals	501 74		
Lectures and Publications	235 00		
Prizes	302 28		
Plants	209 00		
Fruits $134, Vegetables $128	262 00		
Expense paid from Funds		917 75	
Geo. Robert White Medal Fund	493 81		
John C. Chaffin Fund	3 00		
John Lewis Russell Fund	45 00		
Samuel Appleton Fund	38 00		
Marshall P. Wilder Fund	28 00		
John S. Farlow Fund	27 85		
J. D. W. French Fund	282 09		
Home Garden Instruction		600 00	
		$17,557 20	
Bal. of Income from Funds, unexpended		1,684 81	
Excess of Income over Expenditure		422 28	$19,664 29

CHANGES IN CAPITAL ACCOUNT DURING YEAR ENDED DEC. 31, 1918.

RECEIPTS.

50% of Receipts from Mt. Auburn Cemetery	$1,990 38	
$4,000 United Fruit 4% Notes Paid	4,000 00	
General Electric "Rights"	960 02	
Life Membership Fees	350 00	
Chicago & West Michigan Script	53 75	
		$7,354 15
Expended on account of Library Catalogue	500 00	
" for $5000 United States Steel Bonds	5,068 06	
" Capital Increase	1,786 09	
		$7,354 15

ASSETS.

Real Estate	$498,564 63	
Furniture and Exhibition Ware	7,982 61	
Library	46,580 47	
$2,000 Kansas, Clinton & Springfield 5% Bds. 1925	1,980 00	
$10,000 Lake Shore & Mich. Southern R. R. 3½% Bds. 1997	10,000 00	
$21,000 City of Newton 4% Bds. 1928	21,000 00	
$50,000 Atchison Topeka & Santa Fé 4% Bds. 1995	44,693 25	
$50,000 C. B. & Q, Neb. 4% Bds. 1927	50,000 00	
$11,300 Pere Marquette R. R. 5% Bds.	9,933 75	
$25,000 Kan. City Ft. Scott & Memphis 6% Bds. 1928	25,000 00	
$50,000 C. B. & Q., Ill. Div. 3½% Bds. 1949	50,000 00	
$8,000 Boston & Maine R. R. 4½% Bds. 1944	8,000 00	
$4,000 Am. Tel. & Tel. Co. Convert. 4% Bds. 1936	4,000 00	
$4,000 Interborough Rapid Transit 5% Bds. 1966	3,920 00	
$12,000 Pacific Telephone Co., 5% Bds. 1937	11,670 00	
270 Shares General Electric Co.	11,949 88	
Hayes & Loring	2,308 66	
$12,000 United States Liberty Bonds	12,000 00	
$5,000 United States Steel 5% Bds.	5,068 06	
Treasurer's Cash $5,955.65 Bursar's Cash $342.43	6,298 08	
		$830,949 39

LIABILITIES.

Samuel Appleton	Fund	$1,002 00
John A. Lowell	"	1,040 00
Theodore Lyman	"	11,440 00
Josiah Bradlee	"	1,040 00
Benj. V. French	"	520 00
H. H. Hunnewell	"	4,160 00

W. J. Walker	Fund	2,448 59	
Levi Whitcomb	"	520 00	
Benjamin B. Davis	"	520 00	
Marshall P. Wilder	"	1,012 00	
John Lewis Russell	"	1,030 00	
Francis Brown Hayes	"	10,400 00	
Henry A. Gane	"	1,264 00	
John S. Farlow	"	2,655 91	
J. D. W. French	"	5,241 42	
Benjamin H. Pierce	"	832 00	
John C. Chaffin	"	1,265 89	
Benjamin V. French	"	3,120 00	
John Allen French	"	5,200 00	
George Robert White	"	7,517 91	
John S. Farlow	"	3,016 42	
Helen Collamore	"	5,000 00	
Library Catalogue		170 00	$70,416 14
Capital & Reserve			760,533 25
			$830,949 39

Membership.

Life Members, December 31, 1917		797
Added in 1918		14
		811
Deceased		21 790
Annual Members December 31, 1917		191
Added in 1918		10
		201
Deceased	2	
Resigned	1	
Dropped for non-payment of dues	3	6 195
Membership, December 31, 1918		985

Income from Membership.

14 New Life Members at $30	$420 00
10 New Annual Members at $10	100 00
Assessments for 1918	282 00
	$802 00

Balance Sheet — December 31, 1918.

Assets.

Cash;		
Treasurer	$5,955 65	
Bursar	342 43	$6,298 08
Investments		269,214 94
Property, Massachusetts and Huntington Avenues		498,564 63
Furniture and Exhibition Ware		7,982 61
Library Equipment		46,580 47
		$828,640 73

Funds and Capital.

Subscriptions for Library Catalogue	$670 00	
Less Payments	500 00	170 00
Life Membership Fees		4,950 00
Mount Auburn Cemetery Fund		7,137 68
Sundry Funds		65,246 14
Unrestricted Fund		5,000 00
Bequest of F. B. Hayes	247,489 27	
Less Guardian Account $82,496 43		
Trustee Account 2,308 66	84,805 09	162,684 18
Capital Account	564,524 70	
Less loss on bonds	2 50	564,522 20
		809,710 20
Accumulated Reserve		18,930 53
		$828,640 73

Walter Hunnewell,
Treasurer.

AUDITOR'S CERTIFICATE.

40 STATE STREET, BOSTON,
MARCH 5, 1919.

To the Finance Committee of the
MASSACHUSETTS HORTICULTURAL SOCIETY.

Gentlemen:

As requested by you I have made a thorough audit of the books and general accounting affairs of the MASSACHUSETTS HORTICULTURAL SOCIETY for the year which ended with the thirty-first day of December, 1918, and herewith submit to you my report of the same.

REPORT.

I reviewed and checked all additions, entries and postings in the books of the Society which dealt with the income and outgo of moneys; examined the checks and approved vouchers representing disbursements, which were in all instances adequate to sustain the charges of moneys expended; saw that all income was deposited in banks to the credit of the Society and found the amount of cash required by the cash book upon the first day of January, 1919, to have been on hand.

I examined the securities of the Society and they were in all details in accordance with the requirements of the records. All postings from the journal and cash books were traced into the ledger and I certify that the balance sheet of the 31st day of December, 1918, is a correct abstract and that the Treasurer's statement of the assets and liabilities of the Society upon said date is true to the best of my knowledge and belief.

In short, I satisfied myself that the work in connection with the accounting affairs of the Society is being intelligently and faithfully performed and that the books and papers of the Society are in commendable condition.

Yours very respectfully,

ANDREW STEWART,
Certified Public Accountant.

THE ANNUAL MEETING, NOVEMBER 16, 1918.

ANNUAL MEETING FOR THE YEAR 1918.

The Annual Meeting of the Massachusetts Horticultural Society for the year 1918 was held at Horticultural Hall, Boston, on Saturday, November 16, at twelve o'clock noon, with President Saltonstall in the Chair.

The Secretary read the call for the meeting and the President appointed Messrs. E. B. Wilder, J. A. Crosby, and W. P. Rich a committee to receive, assort, and count the ballots, and to report the number, and he declared the polls open until three o'clock.

The record of the preceding meeting of the Society was read and duly approved.

President Saltonstall announced that the Board of Trustees had made an appropriation of $3500 for prizes at the exhibitions of the year 1919, to be expended mainly for the encouragement of fruit and vegetable growing.

Under the head of "Any Other Business" William N. Craig said that it had been clearly proven by the experience of the present year that the elimination of money prizes from the Schedule had caused a decided lack of interest in the exhibitions and that they had not been creditable to the Society. He thought the proposed exclusion of flower shows from the Schedule of 1919 was unfortunate and not for the best interest of the Society.

While not making any formal motion he wished to suggest that the Trustees consider the matter of an appropriation for exhibits of flowers during the coming year. The President answered that the suggestion of Mr. Craig would be presented at the next meeting of the Board of Trustees. He then called Vice President Kidder to the Chair and declared a recess until three o'clock.

At three o'clock Mr. Kidder declared the polls closed and the ballot committee reported through Mr. Wilder the result of the voting as follows:

Whole number of ballots cast 27.

For President, William C. Endicott had 26.

For Vice President (for two years), Nathaniel T. Kidder had 25.

For Trustees (for three years), George E. Barnard had 24; Arthur F. Estabrook, 26; John K. M. L. Farquhar, 22; Richard M. Saltonstall, 22.

For Nominating Committee, William Anderson, 26; Peter Fisher, 25; Robert T. Jackson, 23; Edwin S. Webster, 25; Ernest H. Wilson, 23.

For Amendment to Section IX. of the By-laws the ballots recorded Yes 10, No 17.

Vice President Kidder announced that the following list of officers of the Society for the year 1919 had been duly elected:

President	William C. Endicott
Vice President (for two years)	Nathaniel T. Kidder
Trustees (for three years)	George E. Barnard
	Arthur F. Estabrook
	John K. M. L. Farquhar
	Richard M. Saltonstall
Nominating Committee	William Anderson
	Peter Fisher
	Robert T. Jackson
	Edwin S. Webster
	Ernest H. Wilson

He further announced that the proposed amendment to Section IX. of the By-laws had failed to receive the two-thirds vote required and was therefore not adopted.

The meeting was then dissolved.

William P. Rich,
Secretary.

NECROLOGY, 1918.

NECROLOGY, 1918.

Admitted		Died
1876	Mrs. Nancy Wyman Cutter Holt	January 13
1881	George W. Fowle	January 16
1880	Albert M. Davenport	February 4
1878	Joseph S. Chase	February 16
1889	Benjamin Marston Watson	February 20
1914	Alfred Bowditch	February 22
1914	Miss Fanny Brooks	February 22
1914	George von L. Meyer	March 9
1900	Andrew Robeson Sargent	March 19
1868	George Golding Kennedy	March 31
1914	Mrs. Frederick Ayer	April 3
1893	Mrs. Nancy Jewett Bigelow	April 15
1869	Joseph Tailby	April 25
1910	David Rankin Craig	May 16
1897	Ernest W. Bowditch	May 22
1904	George Barker	June 12
1892	Abraham Shuman	June 26
1894	Jason S. Bailey	July 31
1887	Christopher Minot Weld	August 27
1896	William F. Dreer	September 8
1905	Frank E. Peabody	September 28
1899	D. Webster King	October 21
1913	A. A. Marshall	November 17

OFFICERS, COMMITTEES, AND MEMBERS, 1918.

Massachusetts Horticultural Society.

OFFICERS AND STANDING COMMITTEES FOR 1918.

President.

RICHARD M. SALTONSTALL, of Newton.

Vice-Presidents.

NATHANIEL T. KIDDER, of Milton.
CHARLES S. SARGENT, of Brookline.

Treasurer.

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* Communications to the Secretary, on the business of the Society, should be addressed to him at Horticultural Hall, Boston.

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Revised to December 31, 1918.

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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 lists are inaccurate in any particular, will confer a favor by promptly communicating to the Secretary the needed corrections.

1900 Dr. Henry S. Pritchett, Washington, D. C.
1900 Albert Viger, President of the National Society of Horticulture of France, Paris.
1897 Hon. James Wilson, Ex-Secretary of Agriculture.

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1889 Dr. L. H. Bailey, Ithaca, N. Y.
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1898 John Gilbert Baker, F. R. S., F. L. S., Kew, England.
1875 Professor William J. Beal, Amherst, Mass.
1918 Désiré Bois, Editor of La Revue Horticole, Paris, France.
1918 Léon Chenault, Orléans, France.
1911 W. J. Bean, Royal Botanic Gardens, Kew, England.
1911 John Dunbar, Park Department, Rochester, N. Y.
1887 Sir W. T. Thiselton Dyer, K. C. M. G., F. R. S., "Witcombe," Gloucester, England.
1918 William C. Egan, Highland Park, Ill.
1887 H. J. Elwes, F. R. S., Colesborne, Cheltenham, England.
1889 William G. Farlow, M. D., Professor of Cryptogamic Botany, Harvard University, Cambridge, Mass.
1918 Bertrand H. Farr, Wyomissing, Pa.
1893 B. E. Fernow, University of Toronto, Ontario.
1900 Dr. Beverly T. Galloway, Department of Agriculture, Washington, D. C.
1877 George Lincoln Goodale, M. D., Cambridge, Mass.
1918 Professor N. E. Hansen, Brookings, So. Dak.
1914 C. S. Harrison, York, Nebraska.

1911 Professor U. P. Hedrick, New York Agricultural Experiment Station, Geneva, N. Y.
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1897 J. W. Hoffmann, Colored State University, Orangeburg, S. C.
1918 Charles L. Hutchinson, Chicago, Ill.
1906 Senor Don Salvador Izquierdo, Santiago, Chile.
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1911 Émile Lemoine, Nancy, France.
1918 J. Horace McFarland, Harrisburg, Pa.
1875 T. C. Maxwell, Geneva, N. Y.
1911 J. Ewing Mears, M. D., Philadelphia, Pa.
1911 Wilhelm Miller, Superintendent of Horticulture, University of Illinois, Urbana, Illinois.
1898 Sir Frederick W. Moore, Curator of the Royal Botanic Gardens Glasnevin, Dublin, Ireland.
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1894 Cavalière Enrico Ragusa, Palermo, Sicily.
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1898 Benjamin Lincoln Robinson, Ph.D., Curator of the Gray Herbarium of Harvard University, Cambridge, Mass.
1875 William Robinson, London, England.
1899 William Salway, Superintendent of Spring Grove Cemetery, Cincinnati, O.
1875 Robert W. Starr, Wolfville, N. S.
1893 Professor William Trelease, University of Illinois, Urbana, Illinois.
1918 Dr. Walter Van Fleet, Bureau of Plant Industry, U. S. Department of Agriculture, Washington, D. C.
1882 H. J. Veitch, Chelsea, England.
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1894 Ames, Oakes, North Easton.
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1899 Bigelow, Joseph S., Cohasset.
1899 Bigelow, Dr. William Sturgis, Boston.
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1899 Coolidge, Mrs. J. Randolph, Chestnut Hill.
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1914 Cotting, Mrs. Charles E., Boston.
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1903 Cutler, Judge Samuel R., Revere.

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1902 Davis, Mrs. Arthur E., Dover.
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1899 Gardner, John L., Boston.
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1911 Gill, Miss Eliza M., Medford.
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1885 Goodell, L. W., Dwight.
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1914 Grew, Edward W., Boston.

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1899 Hall, Jackson E., Cambridge.
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1914 Hartt, Arthur W., Brookline.
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1884 Hastings, Levi W., Brookline.
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1903 Hellier, Charles E., Boston.
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1899 Hollingsworth, Z. T., Boston.
1881 Hollis, George W., Allston.
1891 Holmes, Edward J., Boston.
1900 Holt, William W., Norway, Maine.
1899 Hood, The Hon. Mrs. Ellen, Sheen, Surrey, Eng.
1914 Hornblower, Henry, Boston.
1888 Horsford, Miss Kate, Cambridge.
1912 Horton, Arthur E., Lexington.
1902 Hosmer, Oscar, Wenham.
1907 Houghton, Clement S., Chestnut Hill.
1910 Houghton, Miss Elizabeth G., Boston.
1872 Hovey, Charles H., South Pasadena, Cal.
1884 Hovey, Stillman S., Woburn.
1917 Howard, Everett C., Belchertown.
1904 Howard, Henry M., West Newton.
1896 Howard, Joseph W., Somerville.
1915 Howes, Mrs. Ernest, Boston.

1917 Howes, Osborne, Brookline.
1896 Hubbard, Charles Wells, Weston.
1917 Hubbard, Eliot, Boston.
1865 Hubbard, James C., Everett.
1913 Huebner, H., Groton.
1875 Humphrey, George W., Hollywood, Cal.
1917 Hunnewell, Mrs. Arthur, Wellesley.
1912 Hunnewell, F. W., 2d., Wellesley.
1893 Hunnewell, Henry Sargent, Wellesley.
1912 Hunnewell, Mrs. Henry S., Wellesley.
1882 Hunnewell, Walter, Wellesley.
1912 Hunnewell, Walter, Jr., Wellesley.
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1892 Hunt, Dudley F., Reading.
1880 Hunt, William H., Concord.
1904 Hutchins, Rev. Charles Lewis, Concord.

1893 Jack, John George, East Walpole.
1886 Jackson, Charles L., Boston.
1914 Jackson, Mrs. James, Jr., Westwood.
1884 Jackson, Robert T., Peterborough, N. H.
1916 Jahn, Paul H., East Bridgewater.
1916 Jahn, William O., East Bridgewater.
1902 James, Ellerton, Milton.
1902 James, Mrs. Ellerton, Milton.
1913 Jeffries, John Temple L., Cambridge.
1899 Jeffries, William A., Boston.
1865 Jenks, Charles W., Bedford.
1905 Johnson, Arthur S., Boston.
1914 Johnson, Edward C., Boston.
1885 Johnson, J. Frank, Malden.
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1897 Jones, Dr. Mary E., Boston.

1897 Kellen, William V., Marion.
1886 Kelly, George B., Jamaica Plain.
1848 Kendall, D.S., Woodstock, Ont.
1891 Kendall, Dr. Walter G., Atlantic.
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1891 Keyes, John M., Concord.
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1910 Kidder, Mrs. Henry P., Boston.
1880 Kidder, Nathaniel T., Milton.
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1903 Kimball, Richard D., Waban.
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1899 Lamb, Horatio A., Milton.
1913 Lancaster, Dr. Walter B., Brookline.
1899 Lanier, Charles, Lenox.
1917 Lapham, Henry G., Brookline.
1895 Lawrence, Amos A., New York, N. Y.
1873 Lawrence, John, Groton.
1899 Lawrence, Rt. Rev. William, Boston.
1895 Lee, Daniel D., Jamaica Plain.
1914 Lee, George C., Westwood.
1914 Lee, Mrs. George C., Westwood.
1880 Leeson, Hon. Joseph R., Newton Centre.
1902 Leighton, George B., Monadnock, N. H.
1914 Leland, Lester, Boston.
1914 Leland, Mrs. Lester, Boston.

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1899 Loring, Augustus P., Beverly.
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1914 Loring, Miss Louisa P., Prides Crossing.
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1903 Lowell, James A., Chestnut Hill.
1903 Lowell, John, Newton.
1904 Lowell, Miss Lucy, Boston.
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1899 Luke, Otis H., Brookline.
1895 Lunt, William W., Hingham.
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1914 Lyman, C. Frederic, Boston.
1895 Lyman, George H., Wareham.

1898 Mabbett, George, Plymouth.
1912 McKay, Alexander, Jamaica Plain.
1911 McKenzie, Donald, Chestnut Hill.
1868 Mahoney, John, Boston.
1892 Mallett, E. B., Jr., Freeport, Me.
1884 Manda, W. A., South Orange, N. J.
1873 Mann, James F., Ipswich.
1887 Manning, J. Woodward, Reading.
1884 Manning, Warren H., Brookline.
1909 Marlborough, James, Topsfield.
1876 Marshall, Frederick F., Everett.
1898 Marston, Howard, Brookline.
1917 Martin, Edwin S., Chestnut Hill.
1899 Mason, Miss Ellen F., Boston.
1896 Mason, Col. Frederick, Taunton.
1914 Mathews, Miss Elizabeth Ashby, Newton Center.
1901 Matthews, Nathan, Boston.
1906 Maxwell, George H., Newton.
1917 Mead, Francis V., West Somerville.
1902 Melvin, George, South Framingham.
1905 Meredith, J. Morris, Topsfield.
1881 Merriam, Herbert, Weston.
1917 Methven, James, Readville.
1884 Metivier, James, Waltham.
1914 Mifflin, George H., Boston.
1914 Miller, Peter M., Mattapan.
1888 Milmore, Mrs. Joseph, Washington, D. C.
1917 Mink, Oliver W., Boston.
1915 Minot, Mrs. Charles S., Readville.
1908 Minot, Laurence, Boston.
1892 Monteith, David, Hyde Park, Vt.
1896 Montgomery, Alexander, Natick.
1902 Montgomery, Alexander, Jr., Natick.
1896 Moore, George D., Arlington.
1881 Moore, John H., Concord.
1897 Morgan, George H., New York, N. Y.
1914 Morgan, Mrs. J. P., New York, N. Y.
1913 Morison, Robert S., Cambridge.
1899 Morse, John T., Boston.

1909 Morse, John Torrey, 3d., Boston.
1910 Morse, Lewis Kennedy, Boxford.
1913 Morse, Robert C., Milton.
1900 Morse, Robert M., Jamaica Plain.
1914 Morss, Charles A., Chestnut Hill.
1914 Morss, Mrs. Charles A., Chestnut Hill.
1902 Morton, James H., Huntington, N. Y.
1896 Moseley, Charles H., Roxbury.
1909 Moseley, Charles W., Newburyport.
1896 Moseley, Frederick Strong, Newburyport.
1914 Munroe, Howard M., Lexington.
1900 Murray, Peter, Fairhaven.
1897 Mutch, John, Waban.

1917 Neal, James A., Brookline.
1899 Nevins, Mrs. David, Methuen.
1914 Newbold, Frederic R., New York, N. Y.
1874 Newman, John R., Winchester.
1874 Newton, Rev. William W., Pittsfield.
1914 Nicholson, William R., Framingham.
1906 Nickerson, William E., Cambridge.
1914 Norman, Mrs. Louisa P., Newport, R. I.
1881 Norton, Charles W., Allston.

1912 O'Conner, John, Brookline.
1898 Olmsted, Frederick Law, Jr., Brookline.
1892 Olmsted, John C., Brookline.
1898 Orpet, Edward O., Chico, Cal.
1917 Osgood, Miss Fanny C., Hopedale.
1909 Page, George, Newton Highlands.
1909 Page, George William, South Lincoln.
1900 Page, Mrs. Henrietta, Cambridge.
1884 Paige, Clifton H., Mattapan.
1914 Paine, Robert Treat, 2d, Boston.
1908 Parker, Augustine H., Dover.
1913 Parker, Edgar, North Easton.
1911 Parker, Edward, North Easton.
1915 Parker, Miss Eleanor S., Bedford.
1917 Parkhurst, Lewis, Winchester.
1891 Parkman, Henry, Boston.
1914 Patten, Miss Jane B., South Natick.
1897 Patten, Marcellus A., Tewksbury.
1909 Peabody, Francis, Milton.
1909 Peabody, Mrs. Francis, Milton.
1899 Peabody, George A., Danvers.
1881 Peabody, John E., Salem.
1907 Peirce, E. Allan, Waltham.
1916 Peirce, Edward R., Wellesley Farms.
1914 Peirson, Charles Lawrence, Boston.
1915 Penn, Henry, Brookline.
1899 Pentecost, Mrs. Ernest Harvey, Topsfield.
1873 Perry, George W., Malden.
1917 Peterson, George H., Fair Lawn, N. J.
1899 Pfaff, Col. Charles, South Framingham.
1900 Phillips, John C., North Beverly.
1899 Phillips, Mrs. John C., North Beverly.
1899 Phillips, William, North Beverly.
1895 Pickman, Dudley L., Boston.
1902 Pickman, Mrs. Ellen R., Boston.
1881 Pierce, Dean, Brookline.

1892 Pierce, George Francis, Neponset.
1905 Pierce, Wallace L., Boston.
1905 Pierson, Frank R., Tarrytown, N. Y.
1914 Pingree, David, Salem.
1900 Pond, Preston, Winchester.
1892 Porter, James C., Wollaston.
1884 Pratt, Laban, Dorchester.
1914 Pratt, Waldo E., Wellesley Hills.
1898 Pray,James Sturgis,Cambridge.
1899 Prendergast, James M., Boston.
1858 Prescott, Eben C., New York, N. Y.
1914 Preston, Andrew W., Swampscott.
1903 Preston, Howard Willis, Providence, R. I.
1911 Priest, Lyman F., Gleasondale.
1912 Proctor, Henry H., Boston.
1901 Proctor, Thomas E., Boston.
1899 Putnam, George, Manchester.
1900 Putnam, George J., Brookline.

1886 Quimby, Hosea M., M.D., Worcester.

1889 Rand, Harry S., North Cambridge.
1908 Rand, Miss Margaret A., Cambridge.
1903 Rawson, Herbert W., Arlington.
1882 Ray, James F., Franklin.
1890 Raymond, Walter, Pasadena, Cal.
1891 Read, Charles A., Manchester.
1902 Reardon, Edmund, Cambridge.
1892 Reardon, John B., Boston.
1912 Reiff, William, Forest Hills.
1905 Remick, Frank W., West Newton.
1889 Rice, George C., Worcester.
1887 Rich, William P., Chelsea.
1876 Richards, John J., Brookline.
1899 Richardson, Mrs. F. L. W., Charles River Village.
1912 Richardson, H. H., Brookline.
1918 Richardson, William K., Nahant.
1900 Richardson, Dr. William L., Boston.
1905 Riggs, William Allan, Auburndale.
1917 Riley, Charles E., Newton.
1886 Ripley, Charles, Dorchester.
1892 Ripley, Ebed L., Hingham Centre.
1903 Robb, Russell, Concord.
1909 Roberts, Miss Anna B., Boston.
1909 Robinson, Alfred E., Lexington.
1871 Robinson, John, Salem.
1900 Rodman, Miss Mary, Concord.
1911 Rogers, Dexter M., Allston.
1914 Rogers, Dudley P., Danvers.
1899 Rogers, Mrs. Jacob C., Peabody.
1900 Roland, Thomas, Nahant.
1910 Ross, Harold S., Hingham.
1895 Rothwell, James E., Brookline.
1899 Roy, David Frank, Marion.
1881 Ruddick, William H., M. D., South Boston.
1917 Rueter, Mrs. C. J., Jamaica Plain.
1875 Russell, George, Woburn.
1900 Russell, James S., Milton.
1914 Russell, Mrs. Robert S., Boston.

1893 Salisbury, William C. G., Brookline.
1915 Saltonstall, Mrs. Caroline S., Milton.
1912 Saltonstall, John L., Beverly.
1912 Saltonstall, Mrs. John L., Beverly.
1899 Saltonstall, Richard M., Chestnut Hill.

1898 Sanger, Mrs. George P., Boston.
1870 Sargent, Charles S., Brookline.
1899 Sargent, Mrs. Charles S., Brookline.
1902 Sargent, Charles Sprague, Jr., Brookline.
1899 Sargent, Mrs. Francis W., Wellesley.
1896 Scorgie, James C., Cambridge.
1864 Scott, Charles, Newton.
1895 Sears, Miss Clara E., Boston.
1899 Sears, Dr. Henry F., Boston.
1914 Sears, Horace S., Weston.
1899 Sears, Mrs. J. Montgomery, Boston.
1898 Sharp, Miss Helen, Boston.
1914 Shattuck, Dr. Frederick C., Boston.
1914 Shattuck, Mrs. Frederick C., Boston.
1899 Shaw, Francis, Wayland.
1914 Shaw, Henry S., Milton.
1899 Shaw, Mrs. Robert G., Wellesley.
1901 Shea, James B., Jamaica Plain.
1906 Sherman, J. P. R., Newton.
1865 Shorey, John L., Lynn.
1901 Shurtleff, Josiah B., Revere.
1893 Siebrecht, H. A., New Rochelle, N. Y.
1917 Silber, Miss Charlotte G., Needham.
1917 Silsbee, Miss Katharine E., Boston.
1899 Sleeper, Henry Davis, Boston.
1903 Smiley, Daniel, Lake Mohonk, N. Y.
1888 Smith, Charles S., Lincoln.
1872 Smith, Edward N., San Francisco, Cal.
1911 Smith, John L., Swampscott.
1888 Smith, Thomas Page, Waltham.
1874 Snow, Eugene A., Cambridge.
1899 Sohier, Col. William D., Beverly.
1918 Spalding, Miss Dora N., Boston.
1908 Spaulding, John T., Prides Crossing.
1908 Spaulding, William S., Prides Crossing.
1897 Sprague, Isaac, Wellesley Hills.
1884 Stearns, Charles H., Brookline.
1893 Stearns, Frank W., Newton.
1896 Stedman, Henry R., M. D., Brookline.
1914 Stevens, Mrs. Nathaniel, North Andover.
1885 Stewart, William J., Winchester.
1918 Stimpson, Harry F., Chestnut Hill.
1901 Stone, Charles A., Newton.
1889 Stone, Charles W., Boston.
1910 Stone, Mrs. Francis H., South Dartmouth.
1914 Stone, Galen L., Brookline.
1896 Stone, Prof. George E., Amherst.
1849 Stone, George F., Chestnut Hill.
1914 Stone, J. Winthrop, Watertown.
1914 Stone, Nathaniel H., Milton.
1917 Storey, Moorfield, Boston.
1905 Storrow, James J., Boston.
1918 Stranger, David C., West Newbury.
1905 Stratton, Charles E., Boston.
1906 Strout, Charles S., Biddeford, Me.
1914 Sturgis, Miss Evelyn R., Manchester.
1902 Sturgis, Richard Clipston, Boston.
1916 Sturtevant, Miss Grace, Wellesley Farms.
1910 Sullivan, Martin, Jamaica Plain.
1912 Swan, Charles H., Jamaica Plain.
1891 Sweet, Everell F., Malden.
1916 Swett, Raymond W., Saxonville.

1904 Sylvester, Edmund Q., Hanover.

1899 Taylor, Charles H., Boston.
1900 Taylor, Mrs. Thomas, Jr., Columbia, S. C.
1913 Tedcastle, Mrs. Arthur W., Hyde Park.
1896 Tenney, Charles H., Methuen.
1917 Thacher, Miss Elizabeth B., Roxbury.
1912 Thatcher, Arthur E., Bar Harbor, Me.
1898 Thatcher, William, Brookline.
1899 Thayer, Mrs. Alice R., Boston.
1900 Thayer, Mrs. Bayard, South Lancaster.
1899 Thayer, Mrs. Eugene V. R., South Lancaster.
1903 Thayer, Henry J., Boston.
1899 Thayer, John E., South Lancaster.
1899 Thayer, Mrs. John E., South Lancaster.
1899 Thayer, Mrs. Nathaniel, Lancaster.
1899 Thiemann, Hermann, Owosso, Mich.
1899 Thomas, W. B., Manchester.
1910 Thurlow, George C., West Newbury.
1913 Thurlow, Winthrop H., West Newbury.
1874 Tolman, Miss Harriet S., Boston.
1896 Toppan, Roland W., Newburyport.
1899 Tower, Miss Ellen May, Lexington.
1901 Tower, Mrs. Helen M., Cambridge.
1914 Towle, L. D., Newton.
1893 Trepess, Samuel J., Glencove, L. I., N. Y.
1917 Tufts, Bowen, Medford.
1910 Turner, Chester Bidwell, Stoughton.
1914 Tyler, Charles H., Boston.

1910 Underwood, Henry O., Belmont.
1901 Underwood, Loring, Belmont.

1917 Van Brunt, Mrs. Agnes, Readville.
1873 Vander-Woerd, Charles, Waltham.
1899 Vaughan, William Warren, Boston.
1884 Vinal, Miss Mary L., Somerville.

1916 Wagstaff, Archibald, Wellesley Hills.
1909 Wainwright, Arthur, Milton.
1849 Wakefield, E. H., Cambridge.
1876 Walcott, Henry P., M. D., Cambridge.
1895 Waldo, C. Sidney, Jamaica Plain.
1914 Walker, William B., Manchester.
1896 Walsh, Michael H., Woods Hole.
1901 Waltham, George C., Dorchester.
1907 Walton, Arthur G., Wakefield.
1902 Warburton, Chatterton, Fall River.
1912 Wardwell, Mrs. T. Otis, Haverhill.
1894 Ware, Miss Mary L., Boston.
1909 Warren, Bentley W., Boston.
1884 Watson, Thomas A., East Braintree.
1914 Watters, W. F., Boston.
1905 Webster, Edwin S., Chestnut Hill.
1914 Webster, Mrs. Edwin S., Chestnut Hill.
1905 Webster, Frank G., Boston.

1907 Webster, George H., Haverhill.
1896 Webster, Hollis, Cambridge.
1905 Webster, Laurence J., Holderness, N. H.
1909 Weeks, Andrew Gray, Marion.
1902 Welch, Edward J., Dorchester.
1914 Weld, Mrs. Charles G., Brookline.
1917 Weld, Rudolph, Boston.
1899 Weld, Gen. Stephen M., Wareham.
1914 Weld, Mrs. Stephen M., Wareham.
1912 Wellington, Mrs. Arthur W., Boston.
1917 Wellington, William H., Boston.
1882 West, Mrs. Maria L., Neponset.
1887 Wheeler, Frank, Concord.
1889 Wheeler, James, Natick.
1897 Wheeler, Wilfrid, Concord.
1865 Whitcomb, William B., Medford.
1901 White, Mrs. Charles T., Boston.
1899 White, George R., Boston.
1909 White, Harry K., Milton.
1917 Whitehouse, Mrs. Francis M., Manchester.
1905 Whitman, William, Brookline.
1894 Whitney, Arthur E., Winchester.
1894 Whitney, Ellerton P., Milton.
1899 Whitney, Henry M., Cohasset.
1917 Whittemore, Charles, Cambridge.
1915 Wigglesworth, Frank, Milton.
1899 Wigglesworth, George, Milton.
1863 Wilbur, George B., Boston.
1889 Wilde, Mrs. Albion D., West Roxbury.
1881 Wilder, Edward Baker, Dorchester.
1899 Williams, Miss Adelia Coffin, Roxbury.
1905 Williams, George Percy, Boston.
1899 Williams, John Davis, Boston.
1905 Williams, Mrs. J. Bertram, Cambridge.
1905 Williams, Mrs. Moses, Brookline.
1911 Williams, Ralph B., Dover.
1915 Wilson, E. H., Jamaica Plain.
1914 Wilson, Fred A., Nahant.
1881 Wilson, William Power, Boston.
1917 Winslow, Arthur, Boston.
1905 Winsor, Robert, Weston.
1906 Winter, Herman L., Portland, Me.
1914 Winthrop, Grenville L., Lenox.
1914 Winthrop, Mrs. Robert, New York, N. Y.
1914 Winthrop, Mrs. Robert C., Jr., Boston.
1870 Wood, William K., Franklin.
1905 Woodberry, Miss E. Gertrude, North Cambridge.
1905 Woodbury, John, Canton.
1906 Woodward, Mrs. Samuel Bayard, Worcester.
1917 Wright, George S., Watertown.
1900 Wyman, Windsor H., North Abington.

ANNUAL MEMBERS.

1913 Adams, Charles F., Jamaica Plain.
1896 Anderson, George M., Milton.

1912 Babcock, Miss Mabel Keyes, Wellesley Hills.
1911 Bacon, Augustus, Roxbury.
1915 Baker, Mrs. G. B., Chestnut Hill.
1918 Barnes, Rowland H., Newton Highlands.
1898 Barr, John, South Natick.
1916 Barron, Leonard, Garden City, N. Y.
1917 Beal, Thomas P., Jr., Boston.
1917 Blodgett, Mrs. John, Beach Bluff.
1917 Bögholt, Christian M., Newport, R. I.
1901 Bradley, Miss Abby A., Hingham.
1913 Bradley, Miss Julia H., Roxbury.
1873 Breck, Charles H., Newton.
1902 Breed, Edward W., Clinton.
1908 Briggs, Frank P., Ayer.
1909 Brigham, Mrs. Clifford, Milton.
1914 Brown, F. Howard, Marlboro.
1916 Brown, Mrs. G. Winthrop, Chestnut Hill.

1914 Campbell, Ernest W., Wollaston.
1910 Camus, Emil, Boston.
1917 Carlquist, Sigurd W., Lenox.
1904 Chandler, Alfred D., Brookline.
1917 Chase, H. F., Andover.
1918 Chick, Isaac W., Boston.
1917 Child, H. Walter, Boston.
1910 Churchill, Charles E., Rockland.
1916 Clark, Schuyler S., Brookline.
1918 Clarke, Hermann F., Brookline.
1918 Cogger, Thomas, Melrose.
1914 Colt, James D., Chestnut Hill.
1907 Colt, Mrs. James D., Chestnut Hill.
1917 Conant, Mrs. William C., Boston.
1917 Coolidge, Mrs. W. H., Boston.
1915 Copson, William A., Roslindale.
1914 Crocker, Mrs. George Glover, Boston.
1914 Crocker, Joseph Ballard, Chatham.
1914 Crompton, Miss Mary A., Worcester.
1881 Crosby, J. Allen, Jamaica Plain.
1917 Curtis, Allen, Boston.
1875 Curtis, Joseph H., Boston.
1914 Cushing, Mrs. Harvey, Brookline.
1912 Cutler, Mrs. N. P., Newton.
1906 Cutting, Mrs. Isabelle Ladd, Roxbury.

1910 Dahl, Frederick William, Roxbury.
1917 Dalton, Philip S., Milton.
1889 Davis, Frederick S., West Roxbury.
1911 Dolansky, Frank J., Lynn.
1918 Donald, James, Wellesley.
1897 Dorr, George B., Bar Harbor, Me.

1918 Eccleston, Douglas, Beverly Farms.
1916 Estabrooks, Dr. John W., Wollaston.

1902 Farlow, Mrs. William G., Cambridge.

1917 Farr, Mrs. Betty K., Stoneham.
1917 Fiske, David L., Grafton.
1901 Fiske, Harry E., Wollaston.
1894 Fitzgerald, Desmond, Brookline.
1917 Flood, Mrs. Mary, Woburn.
1903 Freeman, Miss Harriet E., Boston.
1905 Fuld, Maurice, New York, N.Y.

1912 Gage, L. Merton, Groton.
1912 Goodwin, Mrs. Daniel, East Greenwich, R. I.
1917 Gordon, George, Beverly.
1917 Graton, Louis, Randolph.
1900 Grey, Robert Melrose, Belmont, Cuba.
1897 Grey, Thomas J., Chelsea.

1908 Hamilton, Mrs. George Langford, Magnolia.
1912 Hardy, John H., Jr., Littleton.
1894 Hatfield, T. D., Wellesley.
1917 Hathaway, Walter D., New Bedford.
1918 Hayes, Herbert W., Waban.
1910 Hayward, Mrs. W. E., Ipswich.
1918 Hecht, Prof. August G., Amherst.
1891 Heustis, Warren H., Belmont.
1916 Hibbard, Miss Ann, West Roxbury.
1914 Higginson, Mrs. Alexander H., Manchester.
1902 Hildreth, Miss Ella F., Westford.
1902 Hill, Arthur Dehon, Boston.
1884 Hill, J. Willard, Belmont.
1912 Hollingsworth, Mrs. Sumner, Boston.
1913 Holmes, Eber, Montrose.
1913 Houghton, Mrs. Clement S., Chestnut Hill.
1917 Howard, W. D., Milford.
1900 Howden, Thomas, Hudson.
1917 Howe, Henry S., Brookline.
1902 Hubbard, Allen, Newton Centre.
1893 Hubbard, F. Tracy, Brookline.

1913 Jenkins, Edwin, Lenox.
1916 Jenks, Albert R., Springfield.
1903 Johnston, Robert, Lexington.

1898 Kelsey, Harlan P., Salem.
1898 Kennard, Frederic H., Newton Centre.
1912 Kirkegaard, John, Bedford.

1889 Lancaster, Mrs. E. M., Roxbury.
1914 Leach, C. Arthur, South Hamilton.
1914 Leary, Dr. Timothy, Jamaica Plain.
1917 Leonard, John E., Wellesley.
1904 Leuthy, A., Roslindale.
1902 Lewis, E. L., Taunton.
1896 Lincoln, Miss Agnes W., Medford.
1901 Loring, Mrs. Thacher, Boston.
1896 Loring, William C., Beverly.
1903 Lumsden, David, Ithaca, N. Y.

1912 McCarthy, Nicholas F., Sou Boston.
1904 MacMulkin, Edward, Boston.
1890 Manning, A. Chandler, Wilmington.
1917 Meader, H. E., Dover, N. H.
1917 Mixter, Dr. Samuel J., Boston.
1914 Morse, Frank E., Auburndale.
1913 Murray, Peter, Manomet.

1916 Nehrling, Prof. Arno H., Crawfordsville, Ind.
1895 Nicholson, William, Framingham.
1904 Nicol, James, Quincy.
1903 Nixon, J. Arthur, Taunton.

1913 O'Brien, Mrs. Edward F., Brookline.

1915 Parker, A. S., Stoneham.
1914 Parker, Miss Charlotte E., Ipswich.
1906 Parker, Eliab, Roxbury.
1892 Parker, Walter S., Reading.
1909 Parker, W. Prentiss, Roxbury.
1908 Peabody, Mrs. W. Rodman, Readville.
1914 Pembroke, A. A., Beverly.
1898 Pierce, Mrs. F. A., Brookline.
1902 Pritchard, John, Bedford Hills, N. Y.
1912 Proctor, Dr. Francis I., Wellesley.
1883 Purdie, George A., Wellesley Hills.
1913 Putnam, Frank P., North Tewksbury.

1906 Rane, Prof. F. W., Waban.
1897 Rea, Frederic J., Norwood.
1912 Reed, H. B., Auburndale.
1914 Rees, Ralph W., Ithaca, N. Y.
1893 Rich, Miss Ruth G., Dorchester.
1888 Rich, William E. C., Ocean Park, Maine.
1900 Robb, Peter B., Whitinsville.
1893 Robinson, Walter A., Arlington.
1917 Rooney, John P., New Bedford.
1915 Rosenthal, Wolf, Boston.
1892 Ross, Henry Wilson, Newtonville.
1903 Ross, Walter D., Worcester.
1909 Russell, Charles F., Weston.
1910 Rust, William C., Brookline.
1918 Rutherford, William D. F., Norfolk.
1918 Ryder, Robert L., Lexington.

1907 Sanborn, Edward W., Boston.
1897 Sander, Charles J., Brookline.
1875 Saunders, Miss Mary T., Salem.
1896 Searles, E. F., Methuen.
1910 Sears, Prof. F. C., Amherst.
1907 Seaver, Robert, Jamaica Plain.
1886 Sharples, Stephen P., Cambridge.
1907 Sim, William, Cliftondale.
1915 Slamin, John, Wellesley.
1910 Smith, D. Roy, Boston.
1914 Smith, George N., Wellesley Hills.
1914 Spaulding, Mrs. Samuel S., Springfield Center, N. Y.
1914 Sprague, George H., Ipswich.
1917 Stephen, A. L., Waban.
1914 Stevenson, Robert H., Readville.
1914 Storey, Mrs. Richard C., Boston.
1914 Sturgis, Miss Lucy Codman, Boston.
1904 Symmes, Samuel S., Winchester.

1914 Thayer, John E., Jr., Lancaster.
1909 Tracy, B. Hammond, Wenham.
1913 Tuckerman, Bayard, Ipswich.

1911 Ufford, Charles A., Dorchester.

1881 Vaughan, J. C., Chicago, Ill.

1915 Wadsworth, Ralph E., Northboro.
1902 Ware, Horace E., Milton.
1917 Warren, Miss Cornelia, Waltham.
1914 Washburn, Paul, Boston.
1914 Waterer, Anthony, 3d, Philadelphia, Pa.
1914 Waterer, Hosea, Philadelphia, Pa.
1889 Welch, Patrick, Dorchester.
1915 Wetterlow, Eric H., Manchester.
1909 Wheeler, George F., Concord.

1897 Wheeler, Henry A., Newtonville.
1917 White, Mrs. Joseph H., Brookline.
1901 Wilder, Miss Grace S., Dorchester.
1897 Wilkie, Edward A., Newtonville.
1913 Williams, Mrs. Emile F., Cambridge.
1889 Winter, William C., Mansfield.

TRANSACTIONS

OF THE

MASSACHUSETTS HORTICULTURAL SOCIETY

FOR THE YEAR 1918

PART I

PUBLISHED BY THE SOCIETY
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NINETEEN HUNDRED AND EIGHTEEN

TRANSACTIONS

OF THE

MASSACHUSETTS HORTICULTURAL SOCIETY

FOR THE YEAR 1918

PART II

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