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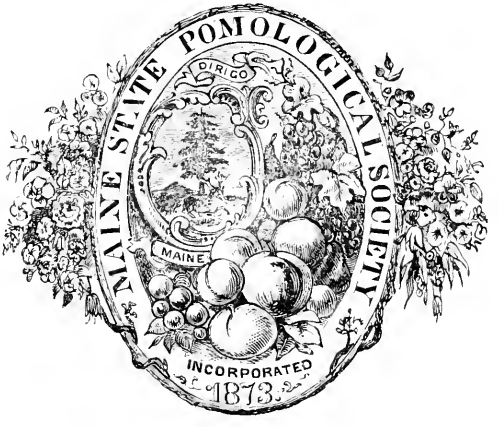
TRANSACTIONS

OF THE

Maine State Pomological Society

FOR THE YEAR 1899,

Including the Proceedings of the Winter Meeting held in New Gloucester, January 18 and 19, 1900.



EDITED BY THE PRESIDENT,

W. M. MUNSON.

AUGUSTA
KENNEBEC JOURNAL PRINT
1900

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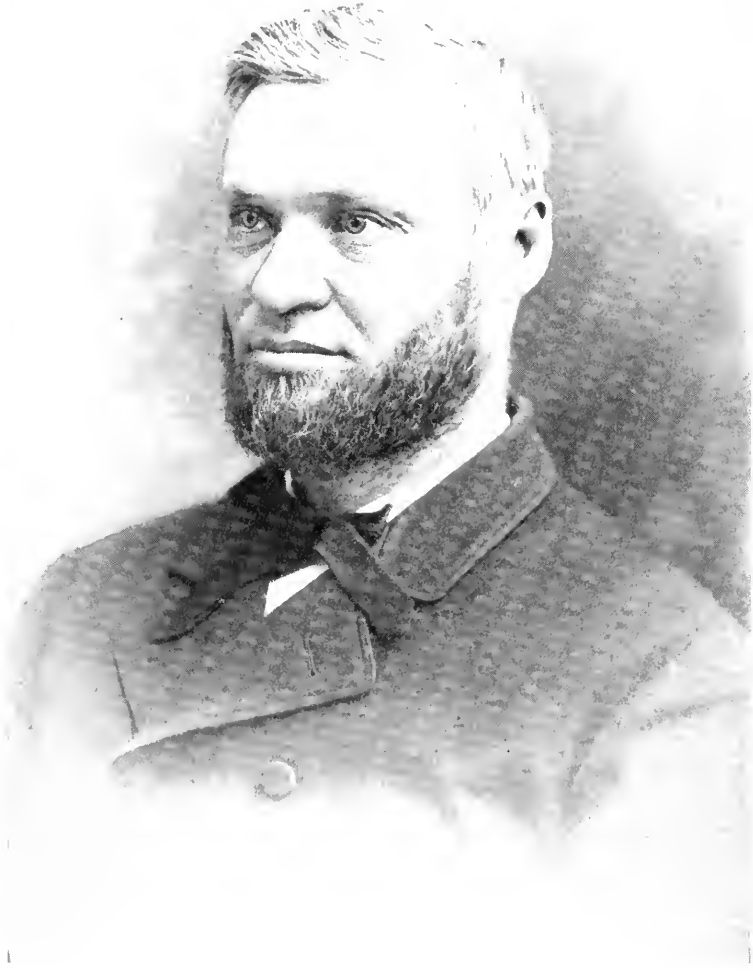

PROF. ELIJAH COOK, VASSALBORO.
Secretary Maine Pomological Society. Died December 29, 1899.

INTRODUCTORY.

Owing to the sudden death of Secretary Cook, just at the close of the year, preparation of a report of the work of the society during 1899 seemed necessarily to devolve upon the President, who was, perhaps, most conversant with that work. Naturally, however, many points that would have been included by the Secretary may be omitted in the hasty preparation of the subjoined notes.

Special mention should be made of the care with which Secretary Cook preserved the records, and of the efficient services of his daughter, Miss Eva Cook, in getting together necessary data.

IN MEMORIAM.

Secretary Elijah Cook.

By the death of Professor Elijah Cook, the Pomological Society loses its secretary, the State Grange its lecturer, the community a public-spirited and strictly honorable citizen, and the poor a friend whose sympathy was unbounded. Although the greater part of his life was occupied in teaching, he ever longed to come more closely in touch with nature, and on his return to this, his native State, after an absence of nearly thirty years, he purchased a farm, and in order to obtain the best results from the same, felt that he must make himself acquainted with the best methods, both in the cultivation of fruits and the tilling of the soil. In consequence he seized the first opportunity to become a member of this society. When chosen secretary, he remarked in his emphatic way: I mean that under my jurisdiction the Pomological Society shall be all that I am capable of making it, by putting into it my best energies. Prof. Cook's success, in whatever he was engaged, was due to his indomitable will and energy of character. This was most markedly displayed while he was yet a young man. He decided at an early age to make teaching his profession and as he was obliged to depend entirely upon his own efforts in fitting himself for this position, he left no stone unturned towards its accomplishment. He even made forty days to the month, during one school vacation, by weaving in the factory nights and a part of each day; thus fitting himself, the man, to become the helpmeet that he was in after years to the hundreds of young men who were fortunate enough to come under the tuition of a man so strong, so self-reliant and yet so unostentatious, kind-hearted and just. No scholar come under his influence, without imbibing something of his nobility and grandeur of soul. Recognizing most

keenly all the faults and mistakes of his pupils, he ever had the most complete faith in their latent powers and inmost soul life and in consequence was capable of calling out the best in them, which is always the mark of the true teacher. Few men have stamped more indelibly than he on the minds of a greater number of young people, traits of character that will make them truer men in their homes, better citizens in their communities and more loyal to their country.

Professor Cook was born at Milo, May 6, 1839. When but four years old he came, with his parents, to Vassalboro, where he remained till he went to Providence to fit himself for the profession which he followed ever after, with the exception of two or three years spent on his farm in Iowa and the two years previous to his death, in Vassalboro.

IRENE B. POPE.

REVIEW OF THE YEAR.

Concerning the fruit interests of Maine, the past year has been remarkable chiefly for the uneven distribution of the crop and for the severe attacks of the forest tent-caterpillar.

Many of the best orchards in the State failed to produce a crop this year while others produced an abundant crop. For instance, one of the largest orchards in Kennebec county produced barely 300 barrels of fruit, while the orchards of Aroostook county were burdened. One firm in Presque Isle shipped more than 1,500 barrels. There is little doubt that the reason for this irregularity in the fruiting of Maine orchards, lies primarily, in the lack of proper care; the trees were allowed to overbear in 1896 and were so weakened that few fruit-buds were formed during the next year or so. On this account little attention was given to tillage, pruning or spraying, and when the caterpillars came in 1897 and 1898, the trees were still further weakened. Therefore, even though apparently free from disease and insect attack this year, there was a lack of buds for producing the desired results. In general, those orchards which have received the same care during the unproductive years as when a full crop was expected, have repaid that care in this year when fruit was scarce and prices were high.

In many parts of Kennebec, Franklin and Oxford counties, the orchards were seriously attacked by both forest and apple tree tent caterpillars. The timely use of Paris green, however, in most cases proved an effectual means of protection. In Kennebec county a band of paper placed around the trunks of the trees, and covered with a mixture of lard and sulphur, proved an effective barrier to the half-grown caterpillars which migrate from the forest or from neighboring trees.

The crop of small fruits was seriously reduced by the long drought of the summer, but, as with the orchard fruits, those plantations which were thoroughly tilled and cared for, gave satisfactory returns. Of the newer strawberries, Clyde and Glen

Mary seem to be growing in general favor, while the London is attracting considerable attention among raspberry growers. Of the currants, White Imperial is highly recommended for home use; but Fay, in spite of its weak habit of growth, remains the leading market sort.

I wish to emphasize, in this connection, the fact that success in fruit growing comes only as the result of patient, persistent effort, and the three elements to strive after are: More fruit from individual plants; fruit of better quality, and the application of business principles in grading, packing and marketing.

THE WORK OF THE SOCIETY.

By the act of incorporation, the Maine State Pomological Society was constituted "a corporation for the promotion of fruit culture." For many years, however, there has been a difference of opinion as to how the interests of fruit growers may best be subserved. Early in the history of the society special meetings or horticultural institutes were suggested, but few were held, and gradually, the policy of spending the larger part of the available funds of the society in the payment of premiums and exhibition expenses, was developed. While the importance of well-organized exhibitions is conceded, the present officers of the society undertook the difficult task of placing the work upon a broader basis, in accordance with the vote of the society at the time of their election. In this task the President and Secretary, upon whom the immediate planning of the work has devolved, have been greatly aided by the sound judgment and advice of their predecessors.

During the year, the premium list for the usual autumn exhibition was thoroughly revised by the executive committee, with the purpose of encouraging the cultivation of those fruits and flowers which merit special attention and excluding those which are only of local interest or are not worthy. A second, abridged, list was prepared for the special winter meeting at New Gloucester.

Besides the two-days' meeting for discussion at Newport, in connection with the autumn exhibition, special field meetings were held at Greene, at Manchester, and at Camden, and a winter meeting and exhibition, at New Gloucester. (The latter,

though held in January, was arranged for in 1899, and the expenses were met from that year's funds.) In these meetings an effort was made to meet the special needs of the particular localities where the meetings were held, as well as to bring out thoughts which should be applicable to the whole State.

THE OUTLOOK.

While encouragement of the pomological interests of the State should remain the primary object of the society, more attention should be given to beautifying the homes of Maine, and to fostering a love for attractive surroundings. It is hoped that during the ensuing year these subjects may be more fully developed. Never before in the history of the State was the outlook more promising for intelligent earnest effort along horticultural lines, and never before in its history has the Maine Pomological Society been so well able to come to the aid of those interested in the work which it represents.

W. M. MUNSON,
President.

OFFICERS FOR 1899.

President.

W. M. MUNSON, Orono.

Vice Presidents.

S. H. DAWES, Harrison,
D. P. TRUE, Leeds Centre.

Secretary.

ELIJAH COOK, Vassalboro.

Treasurer.

CHARLES S. POPE, Manchester.

Executive Committee.

The President and Secretary, *ex-officio;* John W. True, New Gloucester; R. H. Libbey, Newport; L. F. Abbott, Lewiston.

Trustees.

Androscoggin county, John Briggs, Turner.
Aroostook county, Edward Tarr, Castle Hill.
Cumberland county, T. M. Merrill, West Gloucester.
Franklin county, F. D. Grover, Bean.
Hancock county, Mrs. S. L. Brimmer, Mariaville.
Kennebec county, E. A. Lapham, Pittston.
Knox county, Alonzo Butler, Union.
Lincoln county, H. J. A. Simmons, Waldoboro.
Oxford county, Lemuel Gurney, Hebron.
Penobscot county, C. A. Arnold, Arnold.
Piscataquis county, H. L. Leland, East Sangerville.
Sagadahoc county, A. P. Ring, Richmond Corner.
Somerset county, F. E. Nowell, Fairfield.
Waldo county, Fred Atwood, Winterport.
Washington county, J. F. Sprague, Charlotte.
York county, C. A. Hooper, Eliot.

Member Experiment Station Council.

CHARLES S. POPE, Manchester.

BUSINESS TRANSACTIONS.

MEETINGS OF THE EXECUTIVE COMMITTEE.

AUGUSTA, January 24, 1899.—At this meeting it was voted to supply the Secretary of the State Board of Agriculture a speaker to represent the Pomological Society at such institutes as he may desire; the Board of Agriculture to pay simply the travelling expenses.

Voted, That a special field meeting for demonstrating methods of spraying be held in May.

Voted, That the annual meeting and exhibition be held during October or November.

Voted, That as many horticultural schools be held as the funds of the society will permit.

AUBURN, May 8, 1899.—At this meeting it was voted that the annual meeting and exhibition be held at the time and place of the dairy conference of the State Board of Agriculture, provided this occur on or before November 15.

Voted, That the society unite with the Board of Agriculture in holding a field meeting at Sagamore Farm, Camden, during the first week in June.

The question of holding an exhibition in conjunction with the State Agricultural Society was discussed but action was indefinitely postponed.

AUBURN, August 16, 1899: It was voted that the society loan to Mr. A. E. Andrews the plates, vases, racks and vials, for use at the State Fair.

It being found that the time of the dairy conference, would be unsatisfactory, the previous action was reconsidered and the Secretary was requested to arrange for a meeting at Newport, to be held November 15 and 16.

W. M. Munson and Miss G. P. Sanborn were appointed delegates to the meeting of the American Pomological Society to be held in Philadelphia, September 7 and 8.

The premium list for the annual exhibition was revised and extended.

ANNUAL MEETING.

NEWPORT, November 17, 1899.—The minutes of the several meetings of the executive committee were read by the Secretary and were approved.

Professor Munson, as delegate to the American Pomological Society, reported that this old society has taken a new lease of life and that the meeting was most enthusiastic and successful.

The treasurer made an informal report of the finances of the society and it was accepted; the full report to be printed in the transactions.

The election of officers resulted as follows: President, W. M. Munson; Vice Presidents, S. H. Dawes; D. P. True; Secretary, Elijah Cook; Treasurer, Charles S. Pope; Executive Committee, J. W. True, R. H. Libbey, L. F. Abbott; Auditor, Z. A. Gilbert; Member Experiment Station Council, Charles S. Pope.

Amendments to the by-laws were offered as follows:

"Only life-members shall be eligible to hold office in this society."

"No person who has not been a member for at least one year shall be entitled to vote in the society."

Both amendments were laid upon the table for one year.

The president announced the following standing committees:

Nomenclature and New Fruits.—Z. A. Gilbert, Chas. S. Pope, D. H. Knowlton.

Entomology.—F. L. Harvey, Willis A. Luce, G. P. Sanborn.

Botany and Vegetable Physiology.—C. G. Atkins, L. F. Abbott, H. A. Robinson.

The committee on resolutions reported as follows:

Resolved, That the Maine Pomological Society heartily appreciate the efforts of Sebasticook Grange to make this meeting of the society a success, and that we are under special obligation to the members of the choir for the excellent music rendered.

Resolved, That particular mention should be made of Mr. R. H. Libbey, whose active interest and energetic labors have done so much to further the objects of the society.

Resolved, That the society recognizes its obligation to the several newspapers which have given so freely of space for announcements and reports.

Resolved, That the thanks of the society are hereby extended to the Maine Central Railroad for reduced rates and to the proprietor of the Shaw House for the excellent service and low rates given.

PUBLIC MEETINGS.

PAPERS, DISCUSSIONS, AND QUESTIONS.

FIELD MEETINGS,
At Greene, Manchester and Camden.

ANNUAL MEETING,
At Newport.

WINTER MEETING,
At New Gloucester.

FIELD MEETING AT GREENE.

A Pomological School was held at the Grange Hall, Greene, May 9, when the subject of "Small Fruits" was presented by Mr. Chas. S. Pope; "Orcharding" by Secretary Elijah Cook, and "Spraying" by President W. M. Munson. The preparation of Bordeaux mixture and kerosene emulsion were illustrated as were also the right and wrong methods of spraying.

SMALL FRUITS FOR THE HOME GARDEN.

CHAS. S. POPE, Manchester.

(Abstract.)

When the wood was cut off and the land was first cleared our fields and pastures abounded in wild berries and the farmer's table was well supplied with these, but in most localities it is now impossible to furnish a suitable supply from this source. The small fruits, once regarded a luxury, are now considered not only a necessity but an economy also. Therefore the farmer who provides for the table should not neglect his duty in this direction. Ten square rods, well fertilized and tilled, will furnish nearly as many bushels of berries. It may need a little experience to learn the requirements of the different varieties, and then there is no more difficulty in growing a crop of strawberries than one of peas or cabbage. I can assure you it requires only a little Yankee grit to overcome all the difficulties and learn the secrets of success.

THE STRAWBERRY.

The strawberry has the advantage of giving a full crop the next year after setting. Although the plant is small it gives such an immense crop of fruit that it must be well fed and watered. There is very little danger of getting the soil too rich

in phosphoric acid and potash, but some varieties will give an excess of foliage, at the expense of fruit, if too much nitrogen is used. Hard wood ashes are generally easily obtained and make one of the best fertilizers for all fruits. Plow deep and cultivate thoroughly that the plants may take deep root and be able to withstand the drought which frequently comes just as the fruit is filling out.

If the plants are set in rows three feet apart and kept in narrow matted rows (6 inches wide), by cutting all runners which extend beyond this, the ground can be worked with the horse cultivator, when working the vegetable garden. Do not wait until the weeds begin to grow before stirring the soil, but every few days run over the ground and see what a wonderful effect it will have upon the plants. So many of our people till the ground only to kill the weeds and have not learned the effect, and do not realize the need of this frequent stirring of the soil. To obtain a full crop the plant must have a large supply of water when the berries are filling out and there is nothing like a fine earth mulch to conserve the moisture and thus furnish a good supply when most needed. If you have but a little patch, take the hoe along every time you go out to look at it, particularly if the ground begins to bake a little after a shower. Most people do not realize what hoeing means to the plant.

Do not select a piece of land for the strawberry bed where the water can stand and freeze in the winter. As we are not sure of a blanket of snow on the bed all winter, it is best to cover with evergreen boughs as soon as the ground freezes in the fall. Swamp hay or some such material may do as well if not put on deep enough to smother the vines. Do not remove the covering too early in the spring as the frequent freezing and thawing may work much injury to the roots.

There are many little things that must be learned from experience. Do not be discouraged if you fail the first time. My first patch did not give me a quart of berries. A friend gave me the plants and they were a pistillate variety with no other kind to fertilize them. My next attempt was a total loss, as the ice formed on the bed and killed nearly every plant. But the next time I succeeded, although I planted, contrary to all advice, on a heavy witch-grass sward. We picked over two hundred quarts

TREE OF BELLFLOWERS IN ORCHARD OF N. F. NORTON, SOUTH PENOBSCOT.

from five square rods. I attributed my success largely to the use of the hoe. The witch-grass made a strong fight but by taking pains I never allowed it to breathe, and easily came out the victor.

RASPBERRY AND BLACKBERRY.

The treatment of the raspberry and blackberry should be much the same as I have recommended for the strawberry. Do not plant too closely. Three feet apart in the rows, allowing seven feet for blackberries and at least six feet for a row of raspberries, is the proper distance. Keep all sprouts cut down, as weeds, except a few in each hill. More berry patches are ruined by allowing too many sprouts to grow than from any other cause. What I have said about cultivating the soil applies here as well as in the strawberry patch. The raspberry roots run very near the surface and the soil must be kept moist and free from weeds, but worked very shallow.

VARIETIES.

I have little to say about varieties of small fruits, as soil and situation have so much to do with this question. Among strawberries, Crescent and Greenville have been the most prolific with us. Beder Wood and Clyde have been used to furnish pollen for these varieties. The Clyde will produce a large quantity of fruit if given a deep rich soil and plenty of water, but with ordinary treatment is hardly equal to the two first named.

The Snyder blackberry is probably one of the hardiest on the list and will give fine fruit if allowed to remain on the bush until fully ripe,—this means several days after it turns black.

Among the red raspberries, the Cuthbert is an old standard and one of the best. To prevent winter-killing I would recommend bending over the canes and throwing a little dirt on the tips to hold them down. A few shovelfuls of dirt at the base of the canes will prevent breaking at the ground.

The White Imperial Currant is not as acid as the red currants and is therefore fine for the home table. Fay's Prolific is the best red currant we have fruited among a dozen kinds.

In conclusion I would say, secure plants as near home as possible, of the standard sorts, which thrive best in your locality.

These are much more likely to succeed than plants by mail or express from distant nurseries. If you have plenty of money to spare for experimenting, there is great pleasure in testing the new varieties, but few of them are equal to the old standards.

ORCHARDING.

Secretary ELIJAH COOK, Vassalboro.

(Abstract.)

Professor Cook said, in part: While the natural conditions of soil and climate in Maine are well suited for the most successful orchard culture, our methods are not the best. There is everywhere evidence of a lack of care in cultivating and pruning, as well as in harvesting and marketing the product.

The importance of cultivating the young orchard and of careful attention to pruning and spraying were emphasized. In the matter of packing and marketing the product we have much to learn from the California growers. California fruit of inferior quality will outsell native fruit because it is put up in attractive packages.

The abundant use of fruit on the farm will tend to keep the young people at home, and this is a most important thing to do.

With careful attention to details, the outlook for fruit-growing in the State of Maine is very encouraging.

SPRAYING.

Prof. W. M. Munson, Orono.

(Abstract.)

"It is commonly estimated that the annual yield of all crops is lessened about 25 per cent. by the attacks of injurious insects and fungous diseases. Experiments have demonstrated that at least 75 per cent. of this loss can be prevented by the use of simple remedies applied by means of a spray pump. Expressed in figures, the annual loss would represent about $500,000,000 in the United States alone. Of this amount, 75 per cent., or $375,000,000 can be saved by spraying."

The above paragraph represents the facts concerning the importance of spraying, at the present time.

Spraying has ceased to be an experiment. The beneficial results obtained at the experiment stations have been fully corroborated in practical field work, and now it is important to know the *how* and the *why* of spraying. In other words, in order that the best results may be obtained, spraying must be done intelligently.

Success in spraying, as in most of the work in life, is largely a matter of detail. Little things, seemingly unimportant, all affect the results obtained. Failure may usually be attributed to lateness of application, carelessness in applying or in preparing the material, or to defective apparatus.

WHY SPRAY?

Spraying is plant insurance. It is, with few exceptions, a *preventive* measure for many of the ills that plants are heir to, and *not* a cure. There are several distinct classes of enemies which may be grouped first under the two general heads,—insects and fungi.

The insect enemies are naturally divided into distinct classes which must be met in very different ways, and the same is true of the fungi. The first class of insect enemies includes those that, either in the mature form or as larvæ, eat the plant tissue; e. g., the plum curculio, the codling moth, the currant worm, the

tent caterpillar, the potato beetle, etc. These are very readily destroyed by the application of some form of arsenic, as Paris green, to the parts which will be eaten.

Another class of insects, e. g., the plant lice and some of the scale insects, obtain their food by sucking the juices of the plant and, therefore, are not affected by an application of poison. These must be overcome by an external irritant, such as kerosene, or an alkali like caustic soda or strong soap suds, or by some material that will close the breathing pores and thus stop respiration, e. g. pyrethrum or hellebore (in the dry form hellebore acts in both ways).

Fungi (singular, *fungus*) are simply low forms of plant life which feed upon organic matter, either living or dead. Those which grow on living tissues—*parasitic fungi*—are the ones with which we are specially concerned. It is these which cause many of the blights and rusts, and smuts and scabs and mildews of various plants. Fungi are propagated by means of minute, microscopic bodies, called spores, which are carried from place to place by the wind and by insects, birds and other animals. A spore, falling upon the surface of a leaf, or the growing tip of a branch, if in the presence of moisture and the usual summer temperature, germinates in a manner very similar to that of a seed. If the surface of the leaf or fruit is coated with some material which is destructive to the young fungus, as the spore germinates, all the damage from the parasite is warded off. If, on the other hand, there is even a small spot that is not coated, there is opportunity for the parasite to obtain a foothold. With few exceptions, after the parasite has once attacked the plant, spraying is of little if any avail.

WHEN TO SPRAY.

The time of spraying will depend upon the purpose in view, but in *no case* should spraying be done when the plants are in full bloom. Spraying at this time will often interfere with the fertilization of the flowers, and consequently reduce the crop of fruit, while there is much needless destruction of bees and other insects which work upon the flowers.

In general, spray *early*. "Delays are dangerous." Fruit trees should be sprayed before the buds open, potatoes before

disease or insects appear. Subsequent treatment will depend very largely upon the nature of the season; if very wet, it may be necessary to spray every two or three weeks; if relatively dry, three or four treatments may be sufficient.

HOW TO SPRAY.

Insecticides and fungicides are more effective if applied in a liquid rather than in a dry form, since they adhere to the foliage better. *Sprinkling is not spraying.* The best results are obtained from the use of a fine spray or mist forcibly applied to the foliage; and so far as possible, it should reach the under sides of the leaves. A fine mist is preferable to a coarse spray, as there is much less waste of material and much less danger of injury to the foliage. A single dash of the mist is better than continued soaking, as in the latter case the material gathers in drops and runs off or injures the foliage.

As already stated, spraying for fungi is a preventive measure rather than a cure. If the surface of the leaf is not completely covered on both sides, with the protective coating, there is still danger of attack. The spores of the fungus may fall upon the smallest unprotected spot.

Again, while young insects may be killed by a very small dose of poison, a much larger amount will be required as they grow older. So spraying should be commenced early, that the first meal of a young insect may be his last, and in order to insure this end, the poison must be finely divided and evenly distributed.

THE MATERIALS FOR SPRAYING.

The materials used in spraying are mainly of two general kinds, fungicides, used in killing fungi, and insecticides, used in killing insects. The principal fungicides are Bordeaux mixture and sulphide of potassium. The more important insecticides are arsenic, in some form (usually Paris green), kerosene and tobacco.

Bordeaux Mixture. This is the fungicide *par excellence* for general use, and its preparation is a matter of considerable importance. The formula in general use at present is known as the "4, 4, 40" formula. In other words the mixture consists

of 4 lbs. copper sulphate, 4 lbs. fresh lime and 40 gallons of water. The copper sulphate should be dissolved in three or four gallons of water in a wooden or earthen vessel and the lime (which must be absolutely fresh) should be slaked in a separate vessel, and diluted with water till it is of a milky nature. When ready for use, the two solutions may be mixed in a third vessel, care being taken to stir constantly during the process. In every case, the mixture should be passed through a sieve of number 50 brass wire cloth, or through cheese cloth backed by common window screen wire. This straining is necessary to prevent clogging of the nozzle.

Potassium Sulphide. Potassium sulphide, or "liver of sulphur" is specially valuable as a preventive of gooseberry mildew and for use in the greenhouse. In using this material four ounces of the sulphide are dissolved in ten gallons of water.

Paris Green. This material is the one which is always reliable for the destruction of leaf-eating insects. Many other forms of arsenic have been recommended, but none have proved so generally satisfactory as Paris green.† It is practically insoluble in water, but as there is usually present a small amount of soluble arsenic, it is always well to add a little fresh lime to the mixture before applying, that injury to the foliage may be averted. Paris green is generally mixed with water in the proportion of 1 pound to 200 gallons. If lime is added, however, a pound to 100 gallons may be used.

Kerosene. Kerosene is the specific for all sucking insects. It kills by contact and, owing to its cheapness and efficiency, will probably remain the most valuable insecticide for this class of insects. The form in which it is usually applied is the soap emulsion, but there are now several forms of spray pumps which make a mechanical mixture of kerosene and water, thus greatly reducing the labor.

Tobacco. A strong decoction of tobacco ("tobacco tea") is often used with success in destroying the lice upon rose bushes and tender, soft-wooded plants.

† Among the cheaper substitutes for Paris green are "Green Arsenite," "Paragrene," "Emerald Green," "Arsenite of Soda," "Arsenate of Lead," etc. With the exception of the last named, which is largely used by the Gypsy Moth Commission of Massachusetts, the substitutes are still to be considered as experimental.

ARRANGEMENT OF STAGE AT THE WINTER MEETING OF MAINE POMOLOGICAL SOCIETY, NEWPORT, NOV. 16 AND 17.
From photograph by F. M. Dearing, Newport.

The meeting having adjourned to the open field, the speaker proceeded to illustrate the preparation of Bordeaux mixture and of Kerosene emulsion in actual practice. The character of the spray thrown by different nozzles was shown, and several neighboring trees were sprayed. The working parts of various pumps were also explained.

FIELD MEETINGS AT MANCHESTER AND CAMDEN.

MAY 5, AND JUNE 6, 1899.

In accordance with a vote of the executive committee, the society united with the State Board of Agriculture in holding field meetings at Manchester and at Saganore Farm, Camden. The President and Secretary attended these meetings and spoke upon the same subjects as at the field meeting at Greene. Mr. Pope also addressed the meeting at Manchester, and assisted in the demonstration of spraying.

ANNUAL MEETING AND EXHIBITION.

NOVEMBER 16 AND 17, 1899.

NEWPORT, ME., Thursday, Nov. 16, 1899.—The meeting was called to order by the president who, after prayer by Chaplain J. W. Webster of the G. A. R., and singing by the grange choir, called upon Hon. J. M. Sanborn of Newport for an address of welcome.

ADDRESS OF WELCOME.

Hon. J. M. SANBORN, Newport.

Mr. President, Members of the State Pomological Society and Fellow Citizens:

In behalf of the members of Sebasticook Grange and the citizens of the town of Newport, we bid you a sincere and hearty welcome, and extend to you the hospitalities of our town. This is the first time that we have had the honor of your presence with us, and we beg to assure you that your visit will be fully appreciated. We feel that you will pardon us, if we say that your welcome, perhaps from a selfish standpoint alone, is all the more cordial because we wish to place ourselves at your feet for needed instruction. We wish to say that Newport is becoming a prosperous town. We are ambitious, we are determined to expand and develop to the utmost our resources, but in righteous and just ways alone. Now we are the natural center of an extensive agricultural district. The soil of the Sebasticook river, which drains Western Penobscot and Eastern Somerset counties, is not rivalled, in our judgment, in fertility and remunerative capacity, under proper conditions, by the far famed lands of the Aroostook valley.

As a village, therefore, we are interested in agriculture. Our continued development depends largely upon the prosperity of the farmer. He will be considered our greatest statesman and best friend who will do the most to secure and maintain that prosperity. But, notwithstanding our natural advantages, the science of fruit culture in its various branches, is almost in its infancy throughout this community. We have but few large orchards, we may state still fewer good ones. With a few shining exceptions here and there, this whole subject has been sadly neglected by our farmers. Indeed, but little effort was made by too many of them to save their fruit trees from the ravages and blighting effects of the worms and caterpillars during the past season. But on the whole, we feel that our farmers are coming to understand more and more that agriculture is a science which must be mastered, if success is to be attained. They are begin-

ning to study, they are anxious to learn. Thrice welcome then are those who will give the instruction, the enlightenment needed.

It seems to us, further, that the State owes to its grange and to your society a debt of gratitude. Your works have been good in the past, your influence broad in sustaining and restoring sick and discouraged agriculture. And this must always operate as an element of your welcome wherever you may meet. We are all aware of agriculture's deep depression during the past years in this State; of the hard struggle of many of our farmers to maintain themselves, of their trials and discouragements. We have deplored the fact that some of them have felt forced to abandon their homes and seek other occupations. We have felt sad to know that our rural population has been constantly decreasing. The night has indeed been dark, the prospect gloomy. But we believe that a brighter day has already dawned. The law of compensation applies. During this very depression the old system of farming has passed away, a system of theory, of uncertainty, too often of ignorance, with all its weakening and disastrous results.

And on the grave of that old system has sprung up another, a broader, and a better one, a system which requires thoroughness and a practical and scientific knowledge of the subject, a system which exacts that the successful farmer shall be a man of thought and of study as well as of labor, a system which ordains that he shall be a comprehensive man, that he shall look beyond the boundaries of his own fields, participate earnestly in the affairs of State and see to it that his State's laws are wise and wholesome and not injurious to his interests. That agriculture has had this new birth, that we have to-day some prosperous farmers among us, that we feel and have faith to believe that there is coming to the intelligent farmer in the near future a prosperity, the like of which has never been known, is due to some extent surely, we think largely, to the labor and beneficent influence of the grange and your society. We therefore hope that you will enjoy your visit with us and that your good works and influence may continue to increase until this community and the whole State shall contain a population of prosperous and contented farmers. Then, and not until then, will your mission be performed.

RESPONSE—IN BEHALF OF THE SOCIETY.

Secretary ELIJAH COOK, Vassalboro.

Ladies and Gentlemen: It gives me great pleasure to have an opportunity of thanking the honorable gentleman who has so ably, so warmly, and so earnestly bid us welcome to Newport. And to thank the good people of Newport who have worked so earnestly to make this meeting a success. I have been pleased ever since I stepped off the train and met the large-hearted, broad-minded Brother Libbey, and have learned so well the earnest work which he has done, together with the good people of Newport, to provide for all our wants; to help in every way possible to get all the advantage, all the good, that can be obtained from our meeting. We see evidence upon every hand that all the people of Newport are anxious to make our coming here a success, and we are pleased, grateful, and thank these people most earnestly for what they have done.

Every toiler of the soil needs encouragement, needs information, needs inspiration, to help him to make his calling a success, and we hope, in coming here among you, to help you to some extent to enlarge the profits of the farm, to encourage you to improve the methods and enlarge the possibilities of agriculture in this favored section of the State. And when I say favored section of the State, I mean favored of any part of the world. In the great depression through which agriculture has passed, there was no spot on all the earth that suffered less from that depression than this northeast corner of our land. There is no part of all the world that has suffered less or that has more courage to take hold anew and make success in the future. I was pleased with the words to which we have listened. The law of compensation is true, and we have gained much during the depression through which we have passed. We have gained more than we could estimate, if we tried, in the one thought of teaching better, higher methods in the future. The old methods will not do; they have passed away. They served their purpose, but in agriculture, as in everything else, we must use business principles; we must use intellect; we must use thought and investigation all the time. And we hope that our coming here

ORCHARD OF C. S. PHINNEY, STANDISH, FALL OF 1899.

View of Small Trees which have been set three years, showing method of cultivation. Strip of wire netting on the trunk of each tree.

to this section will encourage farmers to take hold of fruit culture more earnestly. If anything that may be said in this hall shall encourage a part of the farmers here to make two trees flourish and bear an abundance of fruit where there is now but one, a part, at least, of our mission will be accomplished, and no one can say that we have failed of success.

RESPONSE—IN BEHALF OF THE CITIZENS OF MAINE.

Dr. George M. Twitchell, Augusta.

Mr. President, Ladies and Gentlemen: What little I have to say is in behalf of those citizens of the State of Maine, present, who realize something of what it means to be so cordially received under such attractive and pleasing conditions, where the labor of the husbandman, and of the housewife, are manifest in so many ways, in the decoration of the hall, and in the details of the work of the local committee, the magnitude of which is not appreciated, except by those who have been through the same labor. Let us first return thanks to Sebasticook Grange, and the citizens of Newport, who have made possible this pleasing display, and completed the arrangements for the two days' meeting of the society. I am very glad to hear Mr. Sanborn speak of the coming of better days. He who watches the State of Maine, to-day, must be conscious that the pendulum is swinging back, and that we are passing out of the stage of depression, and coming to better days in agriculture. Better days to investors and better days to the farmers of Maine. Not during my knowledge of the work in this State have there been so many calls from persons who desire good farm property in the State, as in the past few months. The atmosphere is different from what it was ten or twenty years ago. Here in Newport you have been growing prosperous. I asked the manager of the condensed milk factory to what he attributed the great change, and he pointed to the corn canning factory. I asked the manager of the corn canning factory the same question, and he pointed to the condensed milk factory. Such harmony tends

toward the prosperity of the community. The farms throughout this section give evidence of improvement. At the same time we all realize that the fruit industry of this section is not what it ought to be, and the fruit industry of Maine, and of New England, is not what it ought to be, but by such gatherings as this we solve some of the problems, and get that interest, uplift and stimulus which sends us back to the farms to push the work a little further, and a little harder, than we have in the past.

Professor Robertson, a few weeks ago, in setting forth the marvelous advancement in Canada during the past ten years, gave as the reason above all else why this advance had been so marked, that the "Press of Canada is a unit in praise of the farmers."

Now that one sentence stands as a solution of the whole problem we have to face to-day. Along our dairy and fruit lines let us all have words of praise. When the press stops to criticize there is woe. When the farmers stop complaining of hard times and set their faces toward better times, determined to find them, conscious of the fact that they are solving some of the problems, the trees will not die, and a happy, contented and prosperous people will be settled on the farms of Maine, and elsewhere, and we shall all be singing the song of rejoicing.

Thanking the citizens of Newport for their generous and hospitable welcome, let us take up the last thought that Mr. Sanborn gave us, let us stop complaining and set our faces toward the sun.

THE PRESIDENT'S ANNUAL ADDRESS.

Prof. W. M. Munson, Orono.

In accordance with the custom of previous years it becomes the duty of the president of the society to deliver a short address upon the work of the society, or some subject relating to horticulture. As workers in the same field, we are all seeking to learn the best things to do in the line of horticulture and the best way of doing them. We are striving to bring to bear, in this search after truth, the thought of the scientist, the art of the expert gardener or fruit grower, and the results of the patient experimenter.

It is only by careful, varied and repeated trials and often after bitter disappointments and discouragements that fair conclusions and substantial results are obtained. So in the practical branches of horticultural work, success, in other words, financial gain, comes not to the shiftless or the indolent, but to the wide-awake, up-to-date, energetic growers who profit by the experiences of other growers as well as by their own mistakes and triumphs.

Instead of speaking at length of the work and the aims of the society at this time, I shall ask you to look with me for a few moments at some of the features of the pomology of our State which have not received sufficient attention in the past.

A few years ago Mr. D. H. Knowlton, at that time secretary of this society, delivered a very interesting and instructive paper upon the "Possibilities of Fruit Growing in Maine," in which the advantages and opportunities in this line were most clearly set forth. It is not my purpose at this time either to discuss or to ignore the difficulties and hindrances which must be encountered. The diseases of fruit are apparently increasing in number and severity. The insect enemies are ever with us. But with increasing difficulties comes increasing knowledge of means of combating those difficulties. With the attacks of fungi come the improved fungicides; with the insects comes a broader knowledge of the use of poisons and preventive measures. Ten years ago the treatment of orchards with insecticides and fungi-

cides was in its infancy, and "sprinkling" was ridiculed. To-day every enterprising orchardist in the State recognizes the importance of the practice. This advance in ideas is in no small degree a direct result of the discussions which have been held in the meetings of the Maine Pomological Society.

In the past our farmers have been urged to plant more trees and vines. In the present and the future the watchword must be improvement. Instead of investing more money in planting orchards we must now aim to secure greater returns from money already invested. More attention must be given to fertilizing the orchard, to culture, to tillage, to pruning, to thinning the fruit and to business methods in handling and marketing the product.

POSSIBILITIES IN AROOSTOOK.

No part of the State is better adapted for the general operations of agriculture than is Aroostook county—"the Garden of Maine." The winters of northern Maine are so severe, however, that until recently fruit culture has received comparatively little attention. Indeed, less than twenty years ago the positive assertion was made by a well-known fruit grower and nurseryman that fruit culture was impossible north of the latitude of Houlton.

The first settlers on the Aroostook river seem to have made no attempt at fruit raising. About forty years ago a few apple seeds were planted on some of the upland farms, but the results gave little encouragement. Such of the trees as lived bore inferior or worthless fruit. After a few years the tree-peddler found his way into this fertile, but at that time almost inaccessible region, and in succeeding annual visits introduced many hundred dollars worth of so-called hardy fruits, all of which soon succumbed.

About 1875 the Duchess of Oldenburgh was introduced from New Brunswick nurseries under the name of "New Brunswicker," and this was the beginning of a new era in the pomological history of northern Maine. The Duchess was followed by Alexander, Fameuse (the latter being rather uncertain) and, in 1882, by the Wealthy. A little later Tetofsky, Yellow Transparent and Montreal Peach were added to the list, while in 1890 Dudley's Winter began to be widely disseminated. The last

named variety which, with the Wealthy, has proved to be one of the very best for this northern region, was raised from seed of the Duchess in 1880 by Mr. J. W. Dudley of Castle Hill plantation, and in 1889 was sold to Chase Brothers of Rochester, N. Y., who introduced it under the name of "North Star." The use of this name is unfortunate, since it already belonged to one of the "iron-clad" varieties of the northwest.

The pioneer in commercial orcharding in the Aroostook region was the late Hon. James Nutting of Perham. In 1887 Mr. Nutting planted an orchard of 100 trees three-fourths of which were Duchess, the remainder Alexander, Fameuse and a miscellaneous collection, most of which have since died. In 1885, 100 Wealthy trees were set, and later 500 more of the same variety, with several hundred Dudley's Winter. Among the varieties tried and discarded by Mr. Nutting were Peabody Greening, Red Astrachan, Pewaukee, McIntosh, Haas, Mann, Early Russian, Talman Sweet, Northern Spy, Tompkins King, Ben Davis and several others that are recommended as hardy.

In 1892 the Experiment Station undertook the introduction of hardy varieties into this region and several of the most promising sorts from the Northwest—Wisconsin, Minnesota and Iowa—were placed in Mr. Nutting's hands. Of these, some of the scions were set in bearing trees and others in the nursery. Most of these varieties have now borne, and some of them will prove decided acquisitions to the list of hardy fruits. Among the most promising varieties now on trial in this orchard are Arthur, Okobena, Patten Greening, McMahon, Longfield, Prolific Sweet, Ostrakoff.

About the time that Mr. Nutting commenced orchard culture on a commercial scale, Mr. J. W. Dudley of Mapleton, C. Hayford of Maysville, Benj. Tilley of Castle Hill, and several others awoke to the possibilities in this direction, and the prediction made at the meeting of this society in Bangor in 1891, that "within ten years Aroostook county will not only raise its own apples but have a surplus for export," has been fulfilled. For several years a few apples have been shipped from Caribou and Presque Isle, and during the present year 1,500 barrels were shipped by one firm, Robinson Bros., of Presque Isle.

The present status of fruit growing in Aroostook county is this: Under ordinary conditions every farmer who will, may

grow sufficient fruit for his own use. In many parts of the county, particularly in the hills about Caribou, Washburn and Presque Isle, there are excellent opportunities for commercial orchards, but only the hardiest, "iron-clad" varieties will survive. A windbreak is an absolute requisite of success, but with this protection some varieties of special value may be grown. At the present time no varieties of plum or cherry have been found which are sufficiently hardy to withstand the climate without winter protection. One or two of the Russian cherries—particularly Griotte du Nord—are, however, promising for home consumption. Even the Mooers' Arctic plum, which originated at Ashland, is of uncertain hardiness unless top worked upon the "Canada" plum and laid down each winter.

BLUEBERRIES.

The blueberries of America have been strangely overlooked alike by horticulturists, and by historians; yet there are no less than six or seven distinct species which furnish fruit of considerable value, and as many more which, though of less importance, produce fruit which may be eaten.

Despite the great use that must have been made of the berries by the Indians and by the colonists in New England, there are but few records referring to this fruit. We learn that Champlain, as early as 1615, found the Indians near Lake Huron gathering blueberries for their winter store, and Roger Williams mentions "Attitaash (Wortleberries) of which there are divers sorts, sweet like currants." Aside from two or three minor references, these are about the only records, extant, except in the various botanies and floras published since the beginning of the present century.

Doubtless the reason for this apparent neglect is largely due to the abundance and excellence of the wild plants. There seemed to be no reason for the exertion incident to cultivation in order to procure a liberal supply of fruit.

In New York and in Michigan abortive attempts at cultivation have been made. At the Arnold Aboretum, in Massachusetts, Jackson Dawson has grown many seedlings and has learned some valuable lessons regarding methods of culture. At the present time, however, there is practically no systematic

attention given to the garden culture of the blueberry, save that recently undertaken at the Maine Experiment Station.

In many parts of our State there are thousands of acres of land utterly worthless for agricultural purposes, which after the timber is removed, send up an abundant growth of blueberry bushes, alders, poplars, gray birches, etc., and which by proper management may, it is believed, be made to yield a handsome profit to their owners. In New Hampshire the picking of blueberries has come to be an important industry in many of the country towns. Whereas, a few years ago, farmers thought the blueberry crop of no account, and allowed perfect freedom in gathering the fruit; many of the owners of blueberry pastures now charge "stumpage" at the rate of two cents per quart, and the blueberry field is regarded with as much concern as the apple orchard.

In the southeastern part of Maine, principally in Washington county, there are about 150,000 acres known as the "blueberry barrens." The fruit from the barrens is mainly taken to the canning factories at Cherryfield, Columbia Falls and Harrington. The total output from these factories the present season was about 50,000 cases of two dozen cans each, representing a cash value of considerably more than $100,000.

Now, as already intimated, there are vast areas in our State which, while bearing a considerable number of bushes, and yielding a profitable return to the few people who make a practice of gathering the wild fruit, are not utilized as they might be. The systematic treatment of these wild lands, after the manner practiced on the barrens, might with profit be extended to many other sections.

Again, there are large areas, otherwise worthless, which might without doubt be made to yield good returns if in some way a growth of blueberries could be started—either by setting bushes or by scattering seed. Perhaps this suggestion may be regarded as visionary, but it is quite within the range of possibilities.

Another phase of the subject, which is worthy of careful attention, is that of domestication and the improvement of types by selection.

Little has been attempted in the garden culture of the blueberry. That satisfactory results might be obtained, however,

there is little doubt. The fruit, in its wild state is far superior to that of many other cultivated plants and is very susceptible to the influence of environment. So I feel perfectly safe in predicting that within a very few years, a race of garden blueberries, rivaling in value some of the best of the other small fruits, will be placed before the public and the culture of the blueberry will be as much a matter of course as is that of the blackberry or the raspberry.

CRANBERRIES.

From time to time in the past, the cranberry has been called to the attention of the fruit growers of the State, but this fruit does not yet receive the attention its importance demands. The subject was treated so thoroughly by Prof. Harvey at the meeting of this society in 1896, and the practical details of culture were so well brought out at the last meeting in Augusta (1892), that I shall but refer you to the transactions of the society for those years.

CHESTNUTS.

In various parts of the State are rocky, sandy ridges which are of no particular value for general agricultural purposes, but which are specially suited for the growth of the chestnut tree. Since the common American chestnut is perfectly hardy in Maine, there is every reason why the many bushels of nuts that are used each year should be produced at home; thus adding to the wealth of the farmers, utilizing waste places, and, in many cases, hiding deformities in the landscape. Similar remarks will apply to the hickory nut and to the butternut.

FILBERTS.

The common hazelnut grows freely in many parts of our State, and we all remember the delights of childhood in romping through the fields in search of the brown prizes contained within the ample husks. Closely related to this nut is the English filbert, and I would call the attention of the society to these two nuts as affording a promising line of investigation.

EDUCATIONAL WORK OF THE SOCIETY.

Meetings for mutual interchange of ideas and experiences are most effectual educators. This society early conceived the idea of employing this means of carrying on its work. Right here may I digress for a moment and consider the bearing of education upon the advancement of horticultural interests? It is not the cramming of the mind with an array of facts which will be most beneficial. It is the appreciation of cause and effect; the growth of mental power; the ability to discriminate. There is a loud call for practical instruction from all sides. But the most practical instruction is that which makes an all round man. This is an age of specialists, but the specialist must have a foundation on which to build.

There is an element of uncertainty in all agricultural work. The skilled mechanic may select his material and, applying the principles he has learned, can construct a machine that shall be practically complete and in accordance with his plans and expectations. No farmer or fruit-grower can, however, predict with certainty the outcome of his labors. Nature and Providence have much to do with the processes, and we can only assist the one and submit to the other—we can control neither.

No agricultural college can turn out a farmer who can raise exactly 29 bushels and 35 pounds of wheat per acre year after year. But this does not signify that a young man is not better equipped for his life work because of the training he may obtain at an agricultural college. In other words, a thorough study of the laws of nature, as applied to agriculture, will reduce the uncertainties to a minimum, and will raise the possibilities of production to the maximum. The college brings to bear all of the sciences related to the subject—chemistry, geology, botany, physiology, entomology, etc., and gives to the young man who has these resources, provided he has the additional and very essential quality of sound common-sense, distinct advantage over the man who derives his information solely from the school of experience. In the words of one of the leaders in agricultural education: "The range of practical knowledge is so great that it is unwise to leave its acquirement to the uncertain chances of the chance farmer with chance information. The industry is so great that it is entitled to bring to its aid all that science can

bestow, experiment can demonstrate, and observation can classify. There has, heretofore, been too little intellect and too much luck in the processes of agriculture; too little live investigation, and too much following in the rut made by others."

Granting the desirability of giving our young men and young women a college training as a preparation for their calling in life, we must still meet the fact that the vast majority of such young people, and the older ones as well, cannot avail themselves of such advantages. In order to reach those most in need of help, we must go where the people are. It is the old case of Mohammed and the mountain. If the Board of Agriculture would discuss farming and dairying, it must hold its institutes among farmers or dairymen. So if this society would aid the fruit-growers of the State, it must provide educational means within reach of the class it seeks to benefit.

The attention of the society has heretofore been called to the need of disseminating horticultural influence and information through the State. During the past year your executive committee have undertaken certain work along these lines. Special field meetings were held at Greene, and in conjunction with the State Board of Agriculture at Manchester and at Sagamore Farm, Camden, where the subjects of orchard culture and management were discussed and practical demonstrations of the preparation and application of insecticides and fungicides were made.

The officers have planned to extend this educational work as far as the funds will permit, by means of "horticultural schools" in various parts of the State. At these schools both principles and practical problems connected with the management of fruit plantations will be discussed by men thoroughly conversant with their subjects.

RECOMMENDATIONS.

One of the serious problems in the history of any organization is that of membership. In our own case the great weakness has been in the custom of drawing mainly upon those who take a certain amount of money in premiums at the annual exhibitions. While a few dollars may be saved to the treasury by requiring exhibitors who are awarded more that $10 in premi-

ums to become life members, I do not consider the policy of compulsory membership a wise one.

In many states an important factor in the strength of the state horticultural societies is the auxiliary membership of local societies. It is true that at the present time there are very few such local societies in this State, but I would earnestly commend to the attention of this society the advisability of encouraging the formation of such local organizations and fostering the same in every way possible.

Owing to the increasing importance of a knowledge of the world's progress along the lines of botany and vegetable physiology, as well as in the knowledge of our insect friends and foes, it seems specially important that standing committees be created whose duty it shall be to present to the society each year a resumé of the work done along these lines. I would further suggest that a similar report be furnished each year by the committee on nomenclature and new fruits.

OUR PROSPECTS.

During the past year the fruit-growers have had much to contend with, but the experience of those who have fought bravely the battle against the elements, and against insect and fungous enemies, but more especially against the hold which the customs of the past have upon our practice as orchardists, enables them to see beyond the clouds. The orchardists of Maine are awake as never before to the possibilities of their own calling, and to the importance of doing the right thing at the right time and in the right way.

AFTERNOON SESSION.

The afternoon session was devoted to the general subject of orchard culture. The principal address of the session was,

SOME NEW PROBLEMS IN HORTICULTURE.

Hon. Geo. T. Powell, Ghent, N. Y.

There are certainly problems before us in horticulture, just as well as in other lines of work. The business man has his problems to meet, the manufacturer has his problems continually before him, and this is equally true of us who are cultivating the soil—either as farmers or as fruit-growers. It is because hard problems have been pressing upon us for solution, that we have been passing through this period of depression which has been alluded to in the former addresses to-day; the depression that has rested so heavily over our agriculture. But while this depression has been severe, we have been studying upon these problems, and we have reached the point where we are meeting, now, the solution of some of them. By the very rapid development which has been going on in this wonderful country of ours during the last thirty years, there has developed a great competition in agriculture, and, as the result of competition, there have arisen some of the hard problems which otherwise, would not have to be met. The Eastern farmer, who has been pursuing the raising of grain, has found himself depressed by this competition, and he has been forced to solve the problem of getting larger returns from his labor than by following the old practices once followed here in New England.

The developments in horticulture have been something marvelous during the last quarter of a century. Our country has opened so much territory that we find a rapid extension of the planting of orchards and fruits of all descriptions. Transportation has been so rapidly developed that all portions of our great country seem to be brought closely together, and we meet in Maine markets the products of the far West and the sunny South, side by side with our own.

I was overwhelmed with the planting of apple orchards in Missouri, where a single variety is often found in a block of 100 acres; and there are orchards of 1,000 and 2,000 acres in extent. In passing through these magnificent orchards the question arises, what shall we do, here in the East, to offset this enormous extension of orchards? As we go into our markets we find the Pacific coast is here with us. It becomes an important question, in the future, to know how we are to meet competition which is forced upon us in our own markets from California fruits. The attractiveness of those fruits, the manner in which they are packed and sold, are all of vital importance to us to understand who contemplate planting orchards in New England. Because it is a fact that they are rapidly usurping our position in the Eastern markets. California fruits are to-day leading, they are preferred by the buyers,—perhaps not so much by the consumers—but the buyers prefer the California fruit, and why? Because the California horticulturists have learned the important lesson of not only growing fruit well, of putting it up in the most attractive manner possible.

It was my privilege to stand on the great Erie dock and see a large cargo of fruit sold. It was an important lesson learned, why such an enormous amount of that fruit was sold. I saw, upon one occasion, over sixty different marks of fruit sold in sixty seconds. That is, the different marks were put up and sold and struck off every second for sixty seconds, continuously. It was possible because the fruit was packed so that every buyer knew how it was packed. They knew the quality of the fruit, and when it was offered they had to bid like lightning to get it. And that is the way California fruit is sold.

This brings to us an important question as we contemplate the extending of orchard planting in the Eastern States. That is the question of reorganizing our entire methods. Western orchards are in a high state of cultivation. We can no longer compete with them, but when we plant orchards to-day, we must learn from the Western growers, we must exert our best efforts, our best thoughts, and bring the trees into bearing in the quickest possible time.

How, then, can we shorten the time of bringing orchards into bearing?

I believe that we must recognize, in the planting of trees, the same principles that we recognize in the improvement and development of live stock. I believe that we should recognize in fruit trees the same principles of the law of heredity that we recognize in animal life, and that, if we work upon those principles, it is possible for us to improve our trees and our fruits.

The principles of the propagation of trees have been clearly understood, but I think our practices have not been correct. For instance, in the propagation of trees in nurseries, the seedling stock is usually budded or propagated from the young and growing stock in the nursery rows. The result of this system of propagation is this: We are going to perpetuate in all our trees so propagated the tendency to protracted periods of growth and wood-making. For a number of years I have been experimenting along the line of propagation of varieties, and the growing of trees by the selection of buds and scions from trees that are mature and of unusual merit. The same principle, precisely, that the breeder of live stock follows. Now, in the buds and scions for the propagation of certain qualities which we want in trees, there is as much individuality as there is in live stock. Precisely the same differences in points of quality will be found in trees as will be found in animals. And so, in the selection of the buds which are to be transferred to trees that are to constitute the future orchard, instead of going to the nursery row, where differences in quality cannot be realized, go to the bearing trees in the orchard and there choose the propagating stock.

I started about seven years ago, on this principle with Tompkins King, choosing for stock the Northern Spy tree. The Northern Spy was chosen for the reason that it is a strong and vigorous tree constitutionally. It has great vigor. It has power to resist disease, more so than many kinds of trees. Also power to resist the attacks of insects. In selecting buds to work upon this stock, I sent to Tompkins county, in New York State, where the King apple is known to arrive at the very best condition. I gave directions to select buds from a typical tree; a tree that had a certain characteristic in growth; that, from the nature of its growth would require but little pruning. The fruit must also be typical in character and uni-

form throughout. Those were the requirements sought for in the selection of buds. Nearly 100 of those trees we top-worked five years ago. They came into bearing in much shorter time than I ever had trees bear before. Buds were selected from those trees to start another orchard. Now, the selection was made again with reference to the very finest. Out of 100 trees I found but two or three that came up to the standard, in form and in uniformity of fruit. And so, out of the 100, the selection was narrowed to two or three. This has been the principle upon which my orchards have been built up, and the results that are now beginning to come are certainly beyond my anticipations. I have selected other varieties upon this principle; for example, the Sutton Beauty. This is an old variety of unusual merit. I am glad to be able to show you, this afternoon, fruit of the Sutton Beauty from a tree which was top-worked but three years ago last spring, and produced, this year, two barrels of apples. (Showing sample.) Here is a portion of the wood. Here are side branches taken from the main branch of a tree top-worked three years ago. And those of you who care to examine this wood will see that the very principle I have spoken of is here wonderfully manifested. Despite the very short period within which this tree has been brought into bearing, it is supplied with a fine development of buds for next year, and when the fourth year comes around it is going to show a magnificent setting of fruit. This is an exemplification of the principle. I have no doubt that we can shorten the time of the bearing of orchards. Instead of running seven, eight, and ten years, the third year has already shown fruit to the extent I have mentioned.

(Mr. Powell shows an apple.) Here is a variety known as the Lady Winter Sweet, which at the end of five years' top-work, has produced more than a barrel of fruit. A number of the trees representing this variety, this year came out beautifully laden with perfect fruit. This is an average of the fruit of the tree. Now this is certainly not only interesting, but it gives a great deal of encouragement to take up the study of horticulture. It gives me an entirely new appreciation of the vigor of the land here in the East. It is not uncommon West. There the climatic conditions are so fine, the soil conditions so congenial,

that the trees often show fruit the fourth year, and if, in our northern climate, we can at four years produce a barrel of fruit, and at the fifth year produce two barrels of fruit, we will enjoy that which the western fruit-growers are enjoying.

Now a few words concerning the other kinds of fruits. Plum growing at the East is of importance. The plum is looked upon as a great luxury, and there is no portion of this country where plums are so largely consumed as in the New England States. We in New York depend upon New England as the market for our plums. We recognize the fact that when New England industries are prospering, and when New England mills are running full time, there is no limit to the consumption of plums. So we make a specialty of prune culture. During this year I am putting out something like 500 trees and expect to work them upon this same principle. This is an exceedingly valuable fruit.

The German prune is of high quality, but is of slow growth, and it takes many years for it to come to bearing. The French prune, when grown in California, is of high quality, but it has been supposed we could not grow this prune in New England. It is, however, being grown in New York State. California is shipping hundreds of carloads of prunes to the English markets, and if we compete in those markets we must bring our trees into the earliest possible bearing. If you wish to do this choose a quick-growing tree like the Lombard plum for stock. Use the vigor and strength and the rapid growing habit of the Lombard tree to push forward the rapid development of the prune. I have no doubt in my own mind, that the trees being planted to-day on my own farm will come into bearing in three years. This is our method: We take, for instance, the Lombard plum tree and plant it this fall; or in the spring, where spring planting is more desirable. Next July or August, begin the process of budding. Now the following spring, if the conditions are right, simply cut away the balance of the Lombard wood and you have that tree changed at once into the variety which is so desirable. You also have the hardness, the strength, vigor and vitality of this Lombard plum tree to drive the buds ahead rapidly. I believe the development will be so rapid that the time of getting them into bearing will be reduced three-fourths.

I have here an exemplification of what can be done in intensive peach culture. (Shows branches.) This branch represents the second year's growth, and yet, during this season, strong fruit buds have been developed. The third year, if the winter is not too severe, will show those peach trees in good strong bearing. The trees are from seven to ten feet in height. One branch is of the Wayland variety, and the other the Early Rivers. All of the trees are heavily set with buds. This development is due to a high degree of tillage, showing that when the soil is put into the same condition as that of the Pacific coast, similar results can be obtained.

I wish to speak, at this point, upon another subject before taking up tillage. It is of the influence of fertilization of blossoms. I think we are in the infancy of horticulture. I think we are at the a b c of our lessons. The possibilities that come as we delve into the science, the possibilities that come to us by the study of hybridization and cross-fertilization of our fruits, will give us difficulties that we have not yet realized. And so, in planting varieties, we should study and learn what we can of the effects of cross-fertilization, and of the field open to us to improve our varieties through seedlings. We must build varieties specially adapted to the climate in which we are working. We know of many good things we cannot produce, because the environments are not right, but cross-fertilization opens a new field for building up varieties right upon our own soil, in our own climatic conditions, and so getting new varieties that will withstand the difficulties we find in the severe northern climate.

During last year the conditions during the blooming period were right for the setting of fruit in my own State. We had, during the blooming period, most delightful weather. There was a continuous circulation of the air; there was an opportunity for the insects to work, and every day you could hear the humming of the honey bees. What were the lessons from this? I hold in my hand an apple you will all recognize as the Roxbury Russet. If it were passed through the audience all would say it is a typical Roxbury Russet, and yet it is not a Roxbury Russet. It is a Seek-no-Further. It stood by the side of and very near to a Roxbury Russet tree, and we have in this Seek-

no-Further all the striking characteristics of the Roxbury Russet. Without doubt, we have the effect of cross-fertilization. I cannot explain it in any other way. It shows the influence of one variety on another. The lesson is: Do not plant single varieties in great blocks; plant side by side different varieties, for the reason that is so clearly and strongly marked here, that there is advantage in the free circulation of the pollen to improve the quality of our fruits.

Here is another marked influence (showing another apple.) All of you would recognize this as a Lady Winter Sweet. Yet it is not. It has all the marks, but it is a Seek-no-Further. On the other side of the row there was a Lady Winter Sweet, and here you have all the characteristics of the Lady Winter Sweet. They seem almost identical. Put them side by side and you have the same beautiful color as in the Seek-no-Further, which must have been influenced by the blossom of the Lady Winter Sweet, which was near by.

[The question of the immediate influence of pollen in changing the form and character of fruits has long been discussed without definite conclusions. The specimens shown by Mr. Powell, however, certainly were of a very striking character.—W. M. M.]

A few words upon quality, and then I shall take up tillage, on which I wish to lay great stress this afternoon.

As wealth increases in the country the demand for fine things increases. I think we should recognize this fact in the planting of orchards. We should plant those varieties which are going to be most sought after by those who are not only accumulating wealth, but also by those whose employment gives them the privilege of purchasing these things.

Fine quality would be represented in the apple I should select for planting. Take, for example, the Jonathan. It is a beautiful apple, with exquisite coloring and flavor. Here we have two good qualities combined. If we should grow more of this variety, we should solve the question of the large consumption which is so desirable in this fruit.

I speak of this as one of the important problems to study. We should plan so that when we send a box or a barrel of fruit

to Boston there will be a demand for that apple, because of its intrinsic value.

The Jonathan is an illustration of choice quality, and whoever buys one barrel will want two. This is the principle on which I would recommend the planting of orchards.

For a short time, I want to speak to you of the importance of bringing greater care to our orchard culture. I find, in going through this State, the same conditions that exist in New York, very much neglect of the apple orchards. You follow the practice of putting out apple trees and then letting them take care of themselves. The future demands a different culture from this. If we are to take our apples into the markets, and hold our position, we must put our orchards into fine culture, and then we can compete with any portion of the world. In the first place we must prepare the ground thoroughly, and then we must give to that orchard continuous culture. We must plant apple trees with reference to growing apples, not with reference to growing hay and potatoes upon that land.

VALUE OF TILLAGE.

This brings us to the object and value of tillage. Tillage has the same importance as the wise selection of buds in propagation. It is closely connected with this idea of bringing about the early bearing of trees. Now tillage does two things for us; it enables us to supply the roots of the trees with the food they need; and to improve the condition of the soil so that plant food is made available. In addition to this, tillage enables us to control, in years of short supply, the water already in the soil. During the past year tillage has been of the most importance to the fruit crop of 1900. The orchards that have stood in grass the past year will be found very weak in fruit buds; but orchards under thorough tillage, in this season of drouth, will be found well supplied with fruit buds, and will probably have a satisfactory crop next year.

Farmers have been discouraged because they have been made to believe their farms are worn out. They are nowhere near worn out. It is true that the fertility in your soil in Maine is sufficient in quantity to-day, to support millions and millions, and the lesson for us to learn, the problem for us to solve, is how

to get at this plant food which is so abundant in our soil. We must study and understand not only the plant food, but the action of the water that is essential before the plant food can be made available for the plant. I wish we could look into the soil after a heavy rain has been sending the water down to replenish the reservoirs, and see the action of the water. When summer comes, there begins at once an upward movement of moisture that will be more rapid as the temperature increases. Tillage is one of the important means of controlling and holding in check, this sub-soil supply which, if conserved, will carry most cultivated crops through protracted drouths. Tillage makes the surface soil loose, and gives no opportunity for the water to pass off into the atmosphere, but holds it for the plant we are cultivating.

If I start in the spring-time with a soil full of moisture, I care not if there is no further rainfall, provided I can control the water already in the sub-soil. I have proved it year after year, by growing large crops of apples, pears, and peaches in seasons of drouth. So I have a new understanding of tillage in dry seasons.

In connection with orchard tillage, I have for several years been using crimson clover, and I wish to give you, as rapidly as possible, the actual results that have been obtained by the use of clover for seven consecutive years. I wish to give you the result of building up vegetable matter and bringing to the soil nitrogen, the most valuable food we have to supply. We, in the East, are working under a disadvantage when we are contemplating orchard planting on soil that, for upwards of two centuries has been growing hay, corn, and potatoes, and hence is not in the condition for fruit-growing that it should be. We are at once confronted by this question, How can we bring our soil to the most favorable condition for horticulture? It is a serious matter for us, when we put our hands into our pockets and buy commercial fertilizers. I have been trying to build up the soil in the most economical manner. I once used buckwheat, or rye, and plowed it in, but eight years ago I began sowing crimson clover on my New York farm, and it has brought good results. While speaking to fruit-growers of the economical improvement of the soil, I was asked by a chem-

ist from Cornell, if I knew just what I had been doing. Of course I could give only the general results. The chemist took samples of the soil where three crops of clover had been plowed in, and another of the same kind of soil with no clover in it. He analyzed the two samples. In testing for water he found 15% of the clover-treated land, against 8.75% in the other. At this per cent., on an acre of land six inches deep, which is as deep as we can cultivate in an orchard, he found in favor of the clover-treated land, forty-seven tons more of water than in the other land. Here are two pieces of land, lying side by side, one treated by clover and one not, and the clover treatment made a difference of 47 tons of water per acre.

In testing for humus he found 2.94% in the clover-treated land, against 1.91% in the other.

Testing for nitrogen, he found .21% in the clover-treated land, against .12% in the other. A difference of .09%, or 1,350 pounds in an acre six inches deep. What would it have cost me to put that into my soil? Taking the low valuation of fifteen cents per pound, the lowest cost would have been $200 per acre.

The results may, perhaps, be more clearly stated thus:

	Three Crops Clover.	No Clover.
Water	15.00 %	8.75 %
Nitrogen	.21 %	.12 %
Humus	2.94 %	1.91 %
Phosphoric Acid	.015%	.008%

Available:

Water, 6.25 per cent.—46,875 tons per acre more.

Nitrogen, .09 per cent.—1,350 pounds more per acre.

Phosphoric Acid, .007 per cent.—105 pounds more per acre.

It gives us a new inspiration to find that we can take a plant like clover, and by a few years of free use, so rapidly build up the supply of nitrogen and other vegetable matter the soil needs. I cultivate to the middle of July, and then, when the time comes that cultivation should cease, cover the soil with a growing plant. I choose crimson clover because it is an annual plant, and it grows rapidly, and when cultivation ceases it fills the soil with roots and holds it to the best possible advantage during the winter months. Possibly you in Maine may not succeed as

I have done, but if you will sow the seed from the plants grown on your own land, and repeat the process for several years, the time may come when you can successfully grow this crop in Maine. My first year did not give the best results, but the longer the plant was used in this way, the easier it was to grow it. Now I have eighty acres covered. So continue on, and after several years, if you find it persistently dies, leave it. There is the possibility of so acclimating it that it will be as useful here as in New York.

I hope I have given you some encouragement to go on with orchard extension in your State. I hope I have given you reason to have faith in this attempt, and I am sure if you will follow out high tillage, and select stock as indicated, the acres you plant to trees will give you higher value than anything else you can plant on it. Tillage, spraying, feeding, pruning, selection,—these are the requisites to success in orcharding.

DISCUSSION.

QUESTION: Has Mr. Powell succeeded in carrying a full crop of strawberries under such conditions?

MR. POWELL: I did not touch on small fruits. I will say that I have been applying this system of tillage in strawberry culture to some extent. In 1893, at the Columbian Exhibition in Chicago, a strawberry plant on which there were at one time 243 blossoms, was shown. A great many people doubted the statement, but many counted them and found it correct. I became interested in the possible development of strawberries and began a series of experiments at my place. A plot of land was laid out in 1897, and a crop of red clover was plowed in. Crimson clover was then planted. Then manure was hauled on, and in the spring it was plowed and subsoiled to the depth of 22 inches, and then plowed again. Over ten thousand plants were set, and the cultivator was kept going. Numbers of those plants measured two feet in diameter. What was the result? The development was pressed, of course, to a great extent in the growth of the plant, but some of the plants had as many as 650 berries on them. This shows that the development was carried away beyond anything shown at the World's Fair, and the limit of possibilities is not reached yet.

As to the development this year: The drouth started in April. There was no rainfall to wet the roots of those plants until the whole crop was harvested, so you can see the severe test the work went through for the want of water. Yet, from three-fourths of an acre we shipped 200 bushels of fruit; while about me the berries usually failed. Some picked once or twice, but we picked four continuous weeks on Parker Earle Improved. The other varieties failed right along. Glen Mary, Clyde, Bismarck, and Brandywine, went down after one picking. That is a very rapid outline of what came of this system of high tillage and feeding of plants, during a season the most disastrous of any I ever experienced in strawberry culture.

QUESTION: In top-working trees on Mr. Powell's system can we use scions, and graft in the spring, instead of budding in August?

Mr. POWELL: Yes; and I recommend budding in August, and then, if the buds fail, put the scions on in the spring. Always graft if your buds fail.

QUESTION: How about the use of the Ben Davis tree for stock?

Mr. POWELL: The Ben Davis is recommended by some people, but I do not believe in it. Any tree so prolific as the Ben Davis is naturally a short lived tree. For that reason I do not want it.

QUESTION: Would prunes be hardy here in our climate?

Mr. POWELL: That would be a matter for you to test. For the past year I have raised the fanciest crop I ever produced, and the temperature reached 22 below zero last winter. They can be top-worked on a Japanese plum, but I should use some other variety, such as Lombard, as they are very susceptible to the early spring weather.

QUESTION: Is not the great trouble with plums the black knot?

Mr. POWELL: You would have less trouble with black knot if it were constantly cut out.

EVENING SESSION.

Secretary Cook extended an invitation from the President of the Maine Condensed Milk Company to visit the factory on Friday morning; after which a half-hour was spent with the

QUESTION BOX.

QUESTION: Where shall we market our apples and what variety shall we grow?

Mr. POWELL: If I grew Ben Davis I should seek the general market, whereas if I grew Jonathan, Spitzenburgh, McIntosh Red, Gravenstein, Newtown Pippin, or others equally as good, I should seek the first-class hotels, restaurants and families. Taking one barrel, they will surely want more.

QUESTION: What form of potash is best and cheapest?

Dr. TWITCHELL: Experience alone can determine. For cucumbers, tomatoes, strawberries and peas, it has been found that muriate gave large size but soft watery, inferior fruit, while sulphate improved quality. Sources of supply and cost must be reckoned by results in price realized, and in quality rather than quantity of product.

QUESTION: What is the cure for black knot?

C. S. POPE: Have found no relief save by the knife. Some advocate the Bordeaux mixture early in the season.

QUESTION: At what stage should the first spraying be done for apples and plums?

Prof. MUNSON: For the apple scab spray before the leaves come in the spring, usually in April, using one pound of sulphate of copper in fifteen gallons of water. Again, before the leaves expand, spray with Bordeaux mixture. Immediately after the blossoms fall spray again, adding Paris green for the destruction of the codling moth. Paris green can be added to the Bordeaux mixture for the first spraying if there is danger of the canker worm or tent caterpillar. Never spray while the tree is in bloom, as it is liable to destroy the pistil of the blossom and poison the bees. If you are spraying for the fungus that causes

the dried fruit that remains on the trees all winter (mummied fruit), use sulphate of copper the same as for apple scab, and then Bordeaux mixture, repeated after the leaves appear. The number of times it is necessary to spray depends upon the season. In ordinary seasons three or four times will be sufficient.

Dr. H. A. ROBINSON: I think I have almost a specific for the cure of black knot. There is no doubt that the pest is decreasing at this time. We have less to fight. If all the small twigs can be destroyed, and the rest of the knots covered with the preparation, I think they can be conquered, and easily. I have used, for several years, a mixture every ingredient of which is suited for the purpose, but the mixture of the whole is better. It is linseed oil, kerosene, and spirits of turpentine, equal parts of each, mixed together, and to improve it a small piece of rosin. It makes a sort of varnish. This, applied in the fall, will prevent the ripening of the spores, that takes place in the winter. I have usually applied the mixture twice a year. If it is applied but once, it should be in the fall. I have had large knots slough off the trees, disappear and only a scar remain. I think it is a very effective remedy.

THE BEGONIA IN HOUSE AND GARDEN.

Mrs. M. Elizabeth Pope, Manchester.

This beautiful and deservedly popular plant was introduced about a century ago. It is a native of the tropical South American countries, Mexico and the West Indies; and at the time of its introduction the varieties were more curious than beautiful. A careful and systematic hybridization by European florists of these inferior sorts has gradually led up to the magnificent specimens of to-day, the improvement having been specially marked within the last twenty years.

Until recently the begonia has been grown almost entirely as a hothouse or window plant, but now many varieties, especially the tuberous ones, are found to flourish in the open ground.

The begonias are divided into three well-marked classes: The Rex, grown exclusively for its large palmate and highly ornamental foliage; the Flowering, or Evergreen begonias, of the catalogues, which combine beauty of foliage with a very free-flowering habit, and therefore commend themselves to every one; and the Tuberous, whose foliage is perhaps less beautiful, but whose flowers, in great size, substance and brilliant coloring, far outshine all others.

Begonias may be propagated by cutting off a mature leaf with an inch of the stalk attached. Lay the leaf, after having cut through the largest ribs in one or two places, flat in a box of clean sand, with the stem entirely covered. Pin the leaf down to the sand with two or three wooden toothpicks thrust through it, slanting. The new plants will form at the end of the stem and at the points where the pins hold the leaf in close contact with the sand. If your box can have some bottom heat, so much the better for your success. In either case, keep the sand well watered, allowing no water on the leaf itself. Care should be taken in watering the tuberous, as well as the Rex begonias, that no water stands on the foliage.

All the Rex varieties require partial shade. All need a rest of several weeks during winter, where they may be set back

ORCHARD OF C. S. PHINNEY, STANDISH, FALL OF 1899.
View of some of the Spies.

from the light and watered sparingly till the lengthening days call them to a more vigorous life.

The dry tubers from the florist are likely to be the most satisfactory to the ordinary grower of the tuberous sorts. They may be started early in the spring in flat wooden boxes filled with sand, the tubers to be placed about an inch apart with the tops barely showing. Water well and set in a good light, but not where the hot sun of mid-day will strike them directly. When the tops have made a growth of half an inch, lift carefully from the sand, and if they show an inch or so of fine fibrous roots, they are ready to pot into a rich, loamy soil. The pots should be large enough for the flowering plants as the brittle shoots are likely to be injured in re-potting. They grow more stocky in a lower temperature than some other begonias—50 or 60 degrees being sufficiently warm—and partial shade is desirable in all stages of their growth.

For window culture they may be set directly in a well prepared border or left in pots which are sunk in the ground. The latter method has the advantage that one can easily regulate the water supply, and the tubers are already in pots where they may remain until it is time to start them for another season's growth. I omitted to say that when the tops show signs of decay, water should be furnished more and more sparingly until the stalks drop from the tubers, when the latter may be set away in a cool, dry place, where there is no danger from frost, and kept perfectly dry until spring.

While tuberous begonias are grown primarily for flowers, they are rendered much more attractive by a setting of foliage, always good, and in many varieties strikingly beautiful. It shows many tints of green, is often beautifully shaded, and presents a rich, silvery surface.

The color of the flowers varies from pure white to pink, scarlet and crimson, from palest yellow to deep orange. Among all the begonias, purity of color is a striking feature. Not only are there no ugly colors, but there are the most exquisite tintings and shadings in the light colors, and the most brilliant of scarlets and cardinals.

In the single varieties, as in the flowering begonias, the large pistillate flowers succeed the staminate. The double flowers

are very large, and, as in the geranium, they are much more enduring than the single ones.

While the begonia may be somewhat exacting in its demands, these are readily learned, and it fully repays all care. When we take into account the beauty of the foliage, the great size, delicate texture and exquisite coloring of the flowers, I know of no plant more thoroughly satisfactory to the amateur.

BOYS AND FRUIT.

Secretary ELIJAH COOK, Vassalboro.

I am always glad to have an opportunity to speak a good word for the boys before almost any audience; and I am particularly pleased, to-night, to have the privilege of addressing this large and intelligent audience upon a subject so dear to my heart. We are anxious to increase the herd, to increase the flock, to increase the products of the farm in every way; and yet any one of these is secondary to our duty to, and interest in, the boy and the girl. We are anxious, to be sure, that they shall have broad, well-developed minds; that they shall have strong, vigorous bodies. But it is infinitely more important that they shall have strong characters as well. What advantage to the world though your boy may have the mind of a Webster, and yet be controlled by the lowest character? Environment does much for the proper building of character in the boy and the girl. I shall have to be careful to include the girl, for when we think of the grand opportunities before the boy in this wonderful age, we must remember that the opportunities are just as grand before the girl.

How many lives are wasted for the want of something to encourage and inspire action, and how little it takes, sometimes, to accomplish the change which will make life a success! We cannot be too careful in regard to the environment, in regard to the influence brought to bear upon the boy and the girl. Be careful of their reading and teach them the way in which the great characters of history were built up.

The subject for to-night was Boys and Fruit, suggested to me by the president, and naturally they make a good mixture. How much there is suggested in the way of properly developing the boy, in the cultivation of fruit! A young orchard properly cultivated, tilled and enriched, will accomplish much in making the boy in love with the farm. Keeping the boy on the farm is a grand work, for where, I ask you, in all the world can be found an occupation better adapted to develop all that is acceptable in the young man, than farming, properly conducted? And the fruit comes in here with tremendous importance in this direction. What can you do on the farm that will add more pleasure to the family, more satisfaction to all concerned, than the proper cultivation of fruit?

As an illustration, let me refer to a man at Skowhegan who owns an orchard of Northern Spies. For the past eight or ten years he has sent from eight to twelve barrels of apples, of these Northern Spies, to Boston every year, and he has not received less than $8 per barrel in any year. Faced on the bottom of the barrel, faced on top and clear to the head, with large beautiful apples, highly colored, and nearly all of one size. The sight is indeed a glorious one. When such fruit reaches Boston there is no difficulty in getting almost any price. In order to secure these high prices we must produce better apples. How are we to do this? When you hear of a large crop of corn reported, you know that the ground must have been properly prepared, enriched and tilled, all through the season. Just so with the orchard. We cannot neglect it and get any satisfaction out of the business. How do they raise oranges in Florida? By setting trees on some worn-out land and then neglecting them? No. There is no success in that. They buy land under the most favorable conditions, situated by a lake or river, covered with forest. Often it is land costing $100 per acre. They cut off the forest, clear the land, set the orange trees, and then a man and a mule work year after year on each acre. If such an orchard is neglected for two or three years, it results in the loss of nearly the whole plant. If we should undertake orcharding here in Maine on that scale, investing anything like what they do with the orange grove, and give equal care, what a wealth could be obtained.

Now we are all anxious about the boy, more than all else combined. We have thoughts of leaving something to him when we go over the river. How better accomplish this than by setting a young orchard, and adding to it year by year, cultivating it, enriching it, and having the boy interested in it all times. Such an orchard increases in value and becomes more productive every year, and we are sure of our opportunity to leave something valuable to the boy; surer than we can possibly be in the bank account. It also adds much to the genuine interest of the whole family upon the farm to have an abundance, and to spare, of those luscious fruits of the orchard. But that is not all. The small fruit comes in for a share. How many farmers here in this section raise strawberries, raspberries, blackberries, currants, and gooseberries enough to furnish the family all the year around. If you do not do it, what a grand change it would be to undertake it in the future. What a difference it makes to the wife if she has this abundance of fruit for three meals each day! Not only through the berry season is this true, but in the cold winter as well. No matter what it costs, fruit is a necessity in the home and will pay for itself many times over. It will help to keep the doctor from the door. It will help to make the child pleased and satisfied with the home.

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What are you living for? A man told me the other day, that he was living to get a little bread to eat. God forbid that any of us should be living simply to eat. Let us eat to live! Let us have some thoughts higher, nobler, and grander, than simply to accumulate the almighty dollar. Get something out of life as you go along. It is not the man who accumulates the most wealth who is the richest. Let us go home from this meeting, determined that as for us, let others do as they may, we will take better care of the orchard, produce better fruit, and make the household happy.

FRIDAY, NOV. 17—MORNING SESSION.

The morning session was devoted to the annual business meeting, a report of which may be found on page 14.

AFTERNOON SESSION.

The fifth session was opened with music by the grange choir, after which the following subjects were presented:

PEARS FOR NORTHERN MAINE.

Dr. H. A. Robinson, Foxcroft.

A line drawn east and west, in extension of the southern boundary of Piscataquis county, would divide this State into two about equal portions. South of that line, I believe that most of the common kinds of pears can be grown with a fair degree of success; but north of that line the case is different. It is difficult to make the young trees live, and if some few live they grow very slowly. The trees are often very defective, wounds remain unhealed, the young wood is badly stained by the cold of winter, the trees blossom little and bear less; so that the effort to raise common pears in northern Maine and in northern New Hampshire and Vermont as well, is hazardous and unprofitable. Under these circumstances, what can be done to have pears?

In 1870 the U. S. Department of Agriculture introduced into this country some of the hardy fruits of Russia. Later, in 1882, Prof. J. L. Budd, of the Iowa Agricultural College, and Mr. Charles Gibb of Abbottsford, Canada, spent four months in inter-continental Europe, examining hardy fruits. They found apples, pears, plums and cherries grown in abundance and in many places in profusion all through central Russia, and as far north as Simbirsk and Moscow, latitude 54 to 56 (ten degrees north of this), where the temperature at times is 50 degrees below zero. There they made arrangements for introducing the best of these hardy fruits into this country.

Of pears, there were two types, the "Grucha" and the "Bergamotte," which seemed equally hardy, sometimes making large trees fifty feet in height and two feet in diameter. They were very often planted by the wayside as shade trees; the pear being a very long lived tree, sometimes reaching the age of one or even two hundred years. There were also many wild pear trees, which appeared to be indigenous.

The Grucha type of pear is pyriform, having a neck similar to our ordinary pears, while the Bergamotte is nearly round and is thought to be of Mongolian or Chinese origin. It is not to be expected that these pears, with a habitat in this cold climate, are so large or so fine in quality as our common pears, which came from western Europe. But they will do very well where others cannot be grown.

Professor Budd finds the most of the trees hardy in Iowa and Minnesota.

Dr. Hoskins, of Newport, Vermont, who lives on the highlands bordering Canada, in a climate where common apple trees freeze to death and only the varieties known as "iron-clads" can exist, wrote me four years ago that these Russian pear trees were bearing with him at the age of seven years from the root-graft; that they bear early, and that they are apparently as hardy in his severe climate as the maples and birches of the forest. Mrs. Hoskins writes me recently that their original Russians, now eleven years old, are fine stately trees, early bearers, and heavy yielders; good edible fruit on most of them, and all fine for canning. They should be gathered before quite ripe—as soon as the seeds are well colored, and before if they fall much. She states that they have some thirty trees on the home place, and over 100 on the farm.

Two years ago I visited a half dozen of these trees on the grounds of Mr. E. W. Merritt, of Houlton, Aroostook county. These trees had been set five years, I think. They looked thrifty and were bearing well.

I have also in my own place a few of several varieties of the Russians and others; some two, three, and four years set. The latter are already blossoming and bearing fruit. The Bessemianka, Lutovka, and Gakovska are among the hardiest. Other kinds that I have are Sapieganka, Limber Twig, Early Ber-

gamot, Flat Bergamot, Sacharine, No. 439, Orel No. 15, Mongolian No. 5, Mongolian Snow, Japan Golden Russet, Japan Select, etc.

The Mongolians are not so hardy as the Russians, and the Japans still less so—perhaps not hardier than the Flemish Beauty and Clapp's Favorite—but their growth is thrifty, and their leaves have the beautiful, glossy, luxuriant appearance of the hybrid pears, Keiffer, Garber, Idaho, and Le Conte.

I will give a brief description of some of the more common varieties of Russian pears. First and most widely disseminated is—

Bessemianka: Fruit medium in size and nearly or quite seedless. Flesh tender, juicy, sub-acid, almost buttery, and very satisfactory for dessert use. Season last of August or first of September.

Gakovska: Very hardy. Fair quality. Valuable for cooking and canning. Season, September.

Lutovka: Very hardy and a very fine tree.

Sapieganka: Medium size, nearly round, tender, juicy. Tree not quite so hardy as some of the others.

Limber Twig: Similar to Bessemianka.

Early Bergamot: A fine, healthy tree, hardier than the Wealthy apple. Early summer.

Flat Bergamot: Like the preceding, but later. September.

Mongolian Snow: Hardier than the Flemish Beauty. Leaves always clean, handsome and perfect. Fruit above medium in size, and when ripened in the house better in quality than Kieffer, Le Conte, etc.

Sacharine: This appears to be identical with the Zuckerbiren (Sugar Pear) of northern Germany. It is as hardy as the Wealthy apple. Fruit Bergamot shaped, tender, juicy, nearly melting, and sweet. Season early September.

Dr. Hoskins, in *American Garden,* says that "the northward range of pear culture on the Atlantic slope does not anywhere extend north of 45 degrees, except in Michigan, and in the low valley of Lake Champlain, extending northward to Montreal. A line drawn westward from Bangor, Maine, bending in a long sweep southward of the White Mountains, to Lake Champlain at Burlington, thence to Montreal, will mark the northern limit

of pear culture." This has reference, of course, to the common varieties of pears, and was written before his acquaintance with the Russians.

There is an average difference of one day for every eleven miles of latitude, other things being equal, in the ripening of fruit. I think, however, but few of our people realize the great difference there is in climate in the different sections of the State; or, that to the ordinary difference made by latitude, must be added the difference made by general elevation.

Every three hundred feet of general elevation of a section of country is said to be equal, in climatic effect, to one degree of latitude; so that here at Newport must be added, probably, the effect of about one degree; at Dover and Foxcroft, a degree and a half; and from Blanchard and Monson to Moosehead Lake and northward, the effect of three or more degrees, to the actual latitude.

Of course, this does not apply to abrupt elevations in a place of general low level, since it is well known that these elevations are the ones to be selected as sites for orchards of tender fruits, the cold air settling down into the valleys. But we have reference to the general level of the country.

I fully believe that the Russians will supply the northern part of the State with pears, if only they are planted and cared for; but "success comes only to those who seek it."

A few of them can now be had from some of the general nurseries. Bessemianka may be had from most of the leading nurseries. Gakovska, from the Sioux City Nursery Co., Sioux City, Iowa; Mongolian Snow and Japan Golden Russet, from the Silas Wilson Co., Atlantic, Iowa. The latter variety bears so young that it sometimes fruits in the nursery row. Limber Twig, Sapieganka, and perhaps others may be had from the Fonthill Nurseries, Fonthill, Ontario.

There ought to be a general waking up of the people of northern Maine in regard to this matter of hardy fruits. It is recommended that pear trees be cultivated for about four years, and then that the ground be seeded to grass. But as the trees grow so much more slowly here I should recommend that the cultivation be continued a year or two longer.

ORCHARD OF C. S. PHINNEY, STANDISH, FALL OF 1899.
View of some of the Baldwin trees.

DISCUSSION.

QUESTION: What is the best pear for northern Maine?

DR. ROBINSON: Bessemianca has been the most disseminated and is a hardy tree. Ludovoska is also a good one.

QUESTION: Would Flemish Beauty stand the cold weather?

DR. ROBINSON: It grows in our climate, but is by no means a hardy tree. It takes it a great many years to become a tree of any size.

QUESTION: Is there any way whereby the cracking of the fruit can be prevented, by spraying or otherwise?

DR. ROBINSON: That is a very desirable thing, if it can be found out. I have seen mulching recommended. Alfred Smith recommended that, years ago; but whether effective or not I do not know. I doubt if it is. The theory was that it kept the ground moist and so more favorable to the development of the pear.

PROF. MUNSON: The cracking of the pear is caused by a specific fungus, and we know that this fungus is best controlled by the use of the Bordeaux mixture, which was recommended, last night, for the apple scab, and for other fungus diseases. There is no doubt that with careful, systematic, application of the Bordeaux mixture, we may grow the Flemish Beauty. At the Experiment Station this year, some of the finest specimens I ever saw were grown. They were sprayed with Bordeaux mixture before the buds swelled, and two or three times afterwards.

MR. TRUE: The Flemish Beauty proved, with me, very free from that growth, this year. I may further state I have seen, in Aroostook county, Flemish Beauty growing finely where they thought they could grow no fruit. This was 12 or 15 years ago.

STRAWBERRIES—HOW TO OBTAIN A PROFITABLE CROP.

E. W. Wooster, Hancock.

The first thing to be considered is the selection and preparation of the ground. If greensward is to be used, and the sward is very heavy, on rather low land, it should be planted to some hoed crop and given clean culture for two seasons before setting strawberry plants, to kill the weed seeds and clean out the white grubs, which are almost sure to badly infest such grounds. The best hoed crop to grow on such ground, as far as the advantage of giving clean culture is concerned, is the potato; but the fact that it is a heavy feeder on potash, like the strawberry, must be borne in mind. The best selection of ground, however, that can be made for the strawberry, is that which is taken "right from the green stump." The first cost of fitting such ground is great, but the first year's fruiting will more than repay the extra cost.

Ground should be selected from both up-land and low-land when possible, and of a nature to suit the variety of strawberries to be planted; or, when more convenient, select your variety of strawberries according to your soil.

Such strong growing varieties as the Crescent, Beeder Wood and Warfield, do better on upland shale and rocky soil, while such shy running and heavy foliage varieties as the Bubach, Glen Mary, Ridgeway and Parker Earle do better on heavy soils.

When fitting the ground for the plants, perfect drainage must be carefully looked after. On low, flat land, both under drainage and surface drainage must be given; on up-land good surface drainage only is necessary, that the water during the time that the earth is frozen may pass off quickly, before it freezes and smothers the plants. The ground should be back-furrowed into narrow beds like a good road-bed—the highest part in the middle. The kind and amount of fertilizer, as well as the time of application, depends largely upon the condition of the soil, as to its natural richness, and upon the varieties of strawberries to be planted. This question of fertilizing is one of the most

important, and at the same time most difficult, to be considered in the culture of the strawberry. Upon its correct solution depends the profit of the business.

I depend almost wholly upon commercial fertilizers and chemicals and new soil. Fifteen years of experience has taught me that for fruit, these are much better than stable manure, but if I were growing plants more exclusively for market than for fruiting, and was after quantity rather than quality, stable manure would be just the thing. All varieties require much potash to give them high-colored fruit; the softer the variety the more it requires.

The variety should be selected from those that are known to succeed well in the locality, and selected from the earliest to the very latest, so as to make the season of fruiting as long as possible. The plants should be selected from the very best high-bred stock that can be found nearest to your locality. There is no necessity of their being the so-called "Pedigree" plants, but the plants from which the runners are taken should not be allowed to fruit on that season, as they will need all their strength even with the special culture, to form the best plants. Plants that are forced by an excess of nitrogen and water into a rank top-growth, and allowed to mat thickly are not fit to set. I set thousands of plants every year that I could not afford to sell for ten dollars per thousand, because they would pay me much better than that to let them remain where they grew to fruit; but experience has taught me that I could not afford to set plants of less value. Unless the season is well advanced it is not the best plan to set the plants at first where they are to remain. They should be taken up as early in the spring as the season will permit, all the old foliage trimmed off, the roots shortened to about four inches, and healed in in rich, fine, dry soil. Dig a trench five inches deep a little slanting on one side, against this slanting side lay the plants about three inches apart, with the roots spread out fan-shape, press the earth against them firmly. Then, six inches from this row, dig another trench and proceed as before. In doing the work, be sure that you get the crowns of the plants all even with the top of the soil, and that the roots are wet with muddy water. Plants so treated can remain, if necessary, for more than a month before being

set in the open land, and will not stop growing in the least when re-set. While in the beds they should have plenty of water till a few days before they are to be taken up, when they should be kept dry to the point of almost wilting. When taken up they should be dipped into water and planted at once. Plant them in the field in rows three feet apart, and from one and a half to two feet apart in the row. Cultivate and hoe often, allowing them to form very narrow matted rows, treating all extra plants as weeds.

Never undertake to prepare your ground in the spring till it is dry enough to work up fine. The last of June is not too late to plant strawberries in Maine, if planted the way here described. As fine a bed of strawberries as I ever grew were planted on the second of July. My advice is, however, plant as early as possible in the spring.

A little phosphate containing a large per cent. of nitrogen, should be scattered along the line of the row and well raked in, and after the plants are set, scatter a great spoonful in a ring around each plant, about six inches from it. This phosphate sowing should be repeated some half dozen times during the growing season, but after you have got all the plants you wish rooted, then a brand should be used that contains more potash; and at the last application, late in the fall, muriate of potash at the rate of 250 pounds to the acre, should be used. Never sow chemicals when the foliage is wet or allow any to long remain upon it at any time.

Keep up cultivation till the ground freezes, and then cover with straw, thatch, swamp hay or moss. It is a little dangerous to put moss directly over the plants, unless put on very late and removed by the time that the frost is out in the spring, but it makes a good mulch. Snow is Nature's protection, and of course the very best while it is in place; but it is never reliable along the seacoast, even in its season. Evergreen boughs make the safest artificial winter protection.

In the spring the evergreen boughs must be removed, but the mulching material may be allowed to remain, except over the plants where it should be loosened up, and where too heavy, a part of it removed to the alley-ways. The whole surface between the rows should be mulched for four very important rea-

sons: *First,* it preserves moisture to the soil by the arrest of capillary action. It also prevents the soil from washing badly and from being beaten down hard from the effects of heavy rains, thus allowing more water to pass into the soil during the refreshing summer showers. *Second,* it keeps the fruit from coming in direct contact with the earth, thus keeping it free from grit. *Third,* it keeps down the weeds. *Fourth,* it greatly lengthens the fruiting season. By mulching, the crop will be much larger, the berries will average larger and more beautiful, and consequently will bring a higher price.

Now we come to what I call the commercial department of fruit growing. The most important human requirement is the pleasing of the eye, and strange as it may seem, taste is among the last requirements with the majority. As far as the strawberry is concerned, size and color are all essential. To make these large beautiful berries more pleasing to the eye, they should be carefully graded and put into clean new packages. Every package should be so graded that your name upon the package will stand as a guarantee that the package contains just what is marked thereon. In doing a business of considerable extent, in order to insure this, you must train your pickers very carefully. You must thoroughly educate them up to the mark of proper grading, and thoroughly impress upon their minds the fact, that in working for the interest of their employer, they are also working for their own interest. You must weed out all those who will not appreciate the advantage in doing this; stimulate the best work by giving extra pay for extra work done. Pay off your pickers once each week. Establish a line of customers whose business methods have given to them the best trade and they will appreciate your efforts in trying, through them, to satisfy the requirements of that trade.

DISCUSSION.

PROF. COOK: I had heard a good deal about Mr. Wooster's strawberries. I had talked considerably about them; but last spring I went down to view his plantation, and I assure you that the half had never been told. It was a sight that pleased me through and through. No weeds at all. All his vines, upon some five or six acres, in admirable condition, making use of

what we were told they did, in regard to constant tillage, so that he didn't need water. All of this, to me, was one of the grandest sights I had ever seen. I have seen a great many strawberry beds; I have seen a great many different strawberries, but never anything equalling Mr. Wooster's plantation down on Hancock Point.

QUESTION: I would like to ask Mr. Wooster which variety he grows gives the best results.

Mr. WOOSTER: Sometimes I like one variety a little better one year, and sometimes another. The list changes every year. Sometimes a new one comes along in which I think there is an improvement. I find, perhaps one in fifty, that is an acquisition. I drop the poorest. It is a great disadvantage to have many varieties to care for. About 95% of my ground is occupied by five varieties. The rest I am experimenting with. The variety must depend somewhat upon the soil. For the earliest varieties I have kept, for a long time the Haviland. I have a seedling that I think is earlier, but it takes years to demonstrate that quality. There is another early variety that I shall plant next year. That is the Clyde. It has its difficulties. It is one of the poorest berries for wet weather I ever saw, but in dry weather it is good. It is prone to over productiveness. My greatest producer was Parker Earle. This is a late variety but is very productive. On 1 1-10 acres I gathered, approximately, 14,000 quarts. I commenced to pick on that bed the 14th of July, and the last picking was August 15th—a month on that one variety.

I commenced to ship berries the 23rd of June. I commenced with the Hawaii (one of my own seedlings), a few scattering Clydes and Leavitts. I closed with Parker Earle. The Bubach has been my leading variety. I have received more money from that variety during the last three years, than from any other.

CURRANTS AND GOOSEBERRIES.

A. A. EASTMAN, Dexter.

The frost and the drouth of the present season may lead some of us who are engaged in small fruit culture to look on the dark side and to feel that we have more to contend with than any other class, and in view of this state of things perhaps it would be well to recount some of the advantages of our occupation, and possibly we may find that we have more to encourage than we ever before thought of. Even when things were most prosperous it was natural for us to magnify our difficulties and drawbacks and forget our advantages. Let us now reverse this order and for the time being put aside all our discouragements and consider some of the reasons why we should congratulate ourselves that we are fruit growers.

Fruit growing does not require as great an outlay of physical strength as other modes of farming. There is but little hard work connected with it and for this reason it is a suitable occupation for those who are not able to engage in farming, market gardening, or any employment which involves much hard work. Old men, women, invalids, and children, may spend their little strength in fruit growing and be successful.

Small fruit plants are set out for a special work; that is, to send their roots through every inch of the soil in search of plant food and, having found it, to change it into fruit. Our part is to prepare the soil, set out the plants and see that they have the best possible care to do their work.

As a rule currants and gooseberries are largely overlooked by our fruit growers and farmers; not cultivated at all. They are, however, worthy of a place in the small garden as well as the larger. The fruit can be used in a green state or when ripe, and does not require a great amount of skill in growing.

The habits of growth of currants and gooseberries are very much the same, and they require the same treatment in their cultivation. They are northern fruits, which absolutely refuse to do their best in a southern climate but there is no fruit grown with us that will respond more quickly to first-rate care and

cultivation. They are the only ones of our garden fruits that will endure our most severe winters and come out in the spring without a damaged bud.

In selecting ground for these fruits a moist piece, well underdrained is desirable. If your land is in the sod, plow and till, with a hoed crop, one season. When the crop is off in the fall, about the first of September, prepare the ground. Have it rich, mellow, and in good shape.

In setting out plants, use a garden line so as to have your rows straight, and set the plants in rows six feet apart, and in the row five feet apart. The first two years after the plants are set out you can plant corn or other hoed crops.

In setting currants and gooseberries, set them deep in the soil; they will not bear fruit unless you do it. In setting the plants in the hole, fill partly with soil and then put in some old dressing, and then cover over this dressing with soil two or three inches.

By setting in the fall, say in September, a great deal of time is saved, as new roots will grow until the ground is frozen deep, and in the spring they will take hold and grow and you will hardly believe the plants were moved in the fall before.

Currants and gooseberries are gross feeders and if you want to get a large crop you must feed for it. Use barn dressing and be very liberal with it. This will pay better than a small dose which means a small crop of fruit, poor in quality and poor in price also.

For mulching fruits I use straw, swale hay and forest leaves. All are good, but swale hay lasts longer than straw or forest leaves. Forest leaves will keep down the weeds better than any other mulching however; but you must be very liberal with mulching in order to get any benefit from it.

In preparing for winter protection, first, we do the pruning; cut out the old wood and a part of the new suckers—leaving from two to four on each bush. You get the best fruit from new wood and young bushes. After this work is done, tie them up or draw them together with a string, to keep snow and crust from breaking them down. In the spring cut the string and let them loose for their summer's work.

As a poison, for the currant and gooseberry worms, I use London purple. I like it the best. It is light; it does not sink

in the water like some other poisons; it is cheap, and a pound will go farther than twenty pounds of hellebore. I mix a pound of purple to about two hundred and fifty gallons of water and use it in a knapsack sprayer. One or two good sprayings will put a stop to their bad work. You must keep a sharp lookout for the worms or they will strip your bushes in a short time and the fruit will be small and poor.

Some of the later kinds of currants and gooseberries are the ones to raise, I think, but many others are good. For market we must raise that which sells best, and brings the most money with the least expense and labor. Of the currants, for market, I think the Fay's Prolific takes the lead; but for family use we like the White Grape. This variety is nearly as large as the Fay and very much sweeter.

For gooseberries I like the Downing. This is a heavy bearer and sells in the markets as well as any kind that I know of.

Currants and gooseberries come into bearing at three years old, and will bear fruit for many years, with good care; but I can get what there is in them in from six to ten years by dressing them heavily. We get the best fruit, and largest crops, from young bushes.

In propagating currants and gooseberries by cuttings, take the tips of new wood six inches long and stick them down in the soil the whole length in a rich place in the fall. When the freezing nights come, cover them up with some coarse dressing or boughs for winter. In the spring take off the boughs, but leave the dressing. Gooseberries will not readily root from cuttings, but you may bend a cane down and cover it with dirt when it soon takes root. After one season's growth transplant it where desired.

DISCUSSION.

QUESTION: What time would you spray the gooseberry for the worm?

Mr. EASTMAN: Just as soon as you see the worms at work. It will do no harm if you go all over the bushes. Give them a good spraying. We find the worms at first, on the lower parts of the bushes. As they grow larger, they go up.

QUESTION: What is the best currant for home use, and what the best for marketing?

Mr. POWELL: If I were to be confined to one variety of currants for home use, I would choose the White Imperial. It would not suit the ladies quite so well, largely because the color of the white currant is not so beautiful as that of the red. But the White Imperial is one of the sweetest and richest varieties that I know. It is exceedingly luscious. For market purposes I would hold very closely to Fay's Prolific. This is a beautiful red currant, large in size, with long stems, and it brings the highest price in the market.

There is another variety known as the President Wilder. While the fruit is nearly as fine as Fay's Prolific, the bush has an upward growth, and the fruit is well up. Fay's Prolific has a drooping growth, and the canes are liable to be split down in winter.

EVENING SESSION.

In the evening, as usual, considerable time was spent in the informal discussion of subjects found in the

QUESTION BOX.

QUESTION: What are the best raspberries for general culture?

Mr. WOOSTER: For quality of fruit there is nothing that will exceed the Cuthbert. The Golden Queen is identical with the Cuthbert in quality. For commercial use grow the Golden Queen. (The wisdom of this recommendation is doubted because of the color of Golden Queen.—W. M. M.) The Cuthbert will not ship. Ship your raspberries in large packages, requiring two men to handle them, and they will fare better than if sent in smaller packages.

I cannot see any difference between the Columbian and the Schaffer. I do not think much of the Columbian, as far as quality is concerned. Many would declare that the berries were mouldy; but some accept the fact that it is the nature of the berry. I have quite a trade in this variety. It is one of the hardiest varieties I grow. In some places they winter-kill. But it is a mistake to think they winter-kill from the cold. The trouble is in starting too early in the spring.

Mr. EASTMAN: My experience, in winter-killing, is that when the warm days come and are followed by cold nights, then the plants winter-kill. But if they are fastened down, they will come through all right.

Mr. WOOSTER: Let the ground get thoroughly frozen around the roots of the bushes, then cover with mulch and they will not winter-kill. Let the frost be late in getting out of the ground in spring, and they will not winter-kill.

QUESTION: At what price must apples be sold to repay the expense of growing?

Mr. POWELL: That depends very largely upon the yield you get from your trees. I have known seasons when apples sold at the station for fifty cents per barrel, and at that price were the best paying crop on the farm. The yield was good. One year with another, 75 cents to one dollar per barrel, for the fruit, not including the barrel, will pay all expenses and leave a handsome profit.

QUESTION: What is the average cost of evaporating apples and what price should we expect in the markets?

Mr. POPE: I can simply say that with a small evaporator, with a capacity of fifteen or twenty bushels a day, the cost of evaporating would be four or five cents per pound. A bushel of fruit will make five or six pounds of evaporated apple. Any one can make the reckoning on the profit. The price ranges from five to fifteen cents per pound, depending upon the year, and the quality of the fruit. Three years ago apples were very low, and evaporated apples brought about five cents per pound. The next year they sold readily for twelve to fifteen cents per pound, where the work was done nicely. If your apples are selling for twenty-five cents per bushel, there is no money in evaporating fruit.

Replying to a query as to the difference in varieties, Mr. Pope said: I cannot say which variety is best. Apples picked quite early,—those that blow off early in the fall,—make the whitest fruit, and the dealers prefer them because they are quite acid. Our Maine fruits, Baldwins, and other quite acid varieties, are more sought after in the Boston markets than the western, because, when the apple is evaporated the quality they seek after, the acidity, is reduced. Therefore the sourer the apples

are, the better the fruit will be, and the more sought after. The early fruit will be the whitest and the sourest. The wind-falls are not a dead loss because they make the whitest evaporated fruit.

QUESTION: Will Mr. Powell give his manner of cultivating the cherry?

Mr. POWELL: The cherry requires a good soil, not too rich, but a soil that would produce a good crop of corn. It should stand on high ground where there is a good circulation of the air, in order to avoid the root fungus that is so disastrous in growing cherries.

The cherry orchard should be kept in clean culture for six or seven years. After that any full bearing cherry orchard could be seeded down and left in sod. To stimulate production do not make the cherry tree too luxuriant. The cherry orchard would be the exception to all other orchards in regard to standing in grass.

I can hardly recommend varieties for your climate, as I do not know enough of the conditions. I should think the sour cherries would be much better here. The best are the Early Richmond, which is a very early bearer, and a vigorous tree. Next to the Early Richmond would be the Montmorenci, which is another hardy tree and a fine fruit. It is an exceedingly rich cherry canned. There is another variety of sour cherry, the English Morello. The fruit is astringent, and not as fine in quality as those mentioned.

Among the sweet cherries, I am growing the Black Tartarian, also the Napoleon Bigarreau, which is a beautiful cherry. The Downer is a red cherry, and very hardy, indeed. It is possible you could grow the Downer in Maine. If so it would be a luxury. The Windsor is a hardy, rich cherry. I do not know whether or not you can grow it in Maine. It could be shipped from here to California. It is thick-skinned. It is a trifle new for general recommendation, as is also the Dikeman. This last named variety comes on, with us, after everything else named is gone. This would be a very valuable cherry for you if it would withstand your climate.

The Yellow Spanish is a fine variety, but somewhat tender. It is a beautiful cherry, exceedingly rich; one of the finest when

canned, but with me it does not withstand the winter. The Gov. Wood is a tender cherry, but an excellent variety.

When you plant cherries, plant two or three extra trees for the robins. I make that my practice in planting cherries. I put out such as the Gov. Wood for the birds.

Mr. ATHERTON: Something has happened to the cherry trees in Hallowell by which they are all dying. All die down in one winter. Perhaps the gentleman has had something of a similar nature in his experience. In regard to the Black Tartarian, I have some of the trees and they have something exude from them that injures the tree.

Mr. POWELL: Very frequently we lose trees from sun scald. We have a few days of bright weather and, though the ground is frozen, circulation will be stimulated, and then comes freezing. Where sun scald takes place, you will have the exudation of moisture. It is a peculiar condition that comes from the rising temperature. I have lost numbers of trees from the very same cause. I should say sun-scald was the trouble with your trees.

Mr. TRUE: I think it is well brought out that the cherry has not done well in Maine, except in favored localities. If others differ I would like to hear from them, for I think a great outlay in the finer varieties would prove a loss.

Mr. WOOSTER: I have lost a number of trees out of the hundred I had originally. Of the varieties mentioned here I have some that succeed with me. The Montmorenci is one. The Early Richmond has not been successful with me. The Gov. Wood is a beautiful, ornamental tree. I get a few cherries by taking them before they are ripe. They seem to be hardy. I have some other varieties. The Ostheim is very hardy, but a miserable growing tree. The conditions do not seem to favor it.

QUESTION: What shall we do for the rust and mildew on currant and gooseberry bushes?

Prof. MUNSON: Spray with Bordeaux mixture for the rust; with sulphide of potassium (liver of sulphur) for gooseberry mildew.

QUESTION: What is the best gooseberry for the market?

Prof. MUNSON: The Downing.

EXPERIENCES WITH CATERPILLARS.

CHARLES S. POPE, Manchester.

If we are to raise fruits we must fight the insects, and just at this time, particularly, the caterpillar. We all know, to our sorrow, what we have had to contend with in past years.

Twenty-five years ago our orchards were infested by the canker worm. It never was heard of in our section before, although in Massachusetts the orchards had been stripped for years. We fought it as best we could, and succeeded pretty well, after two years' fighting. The very next year the forest tent caterpillar made a raid the same as they did last year and the year before. In our old orchard we were unable to fight them, and the orchard was completely ruined. At that time we learned how it was possible to keep the caterpillar out of the tree when we once cleared it, and in that way we were able, when they made a raid two years ago, to fight them successfully from the beginning.

We knew nothing, then, of spraying with Paris green. After sweeping the caterpillars from the tree they would fall down and then start for the tree. As soon as they struck the trunk they were up and at it again. In some way we learned that they would not cross a band of grease. The next question was, what to put on for grease that would not run in the sun. It was discovered that a mixture of lard and sulphur was the best. We tried tar and printer's ink, but in a few days that mixture would dry. By mixing sulphur with the lard it would not run. To keep the mixture from the tree we put on oil-cloth carpeting. That is the best of anything we have found, but it is not available in all sections. We can go to the sand-paper factory and get a paper that is good. The glue makes a sizing which prevents the grease from striking in. Tarred paper will serve a very fair purpose.

So much for preventing the caterpillars from climbing up. That is the way we were obliged to fight at that time. Now comes the question, How shall we fight them at the present day? With Paris green. But some of you say, We

tried that last year. It was recommended, we gave them a heavy dose of Paris green, but they kept on eating. The secret of success is to begin spraying just as soon as the caterpillar hatches, and that is before the buds open. Go before the snow is off the ground, and you will find those little caterpillars living on the hope of what they expect to get later. Give them a dose then; one pound to a hundred gallons of water, and keep it up every week or ten days. There are sections you cannot reach; you cannot get your pump into your wagon, and you are obliged to fight them by hand, as we were, in some parts of our hillsides, among the rocks. There we fought by hand; we used suds made from strong soft soap, and then put on the band of lard and sulphur.

In most orchards, even if you are fighting with Paris green, I would recommend putting on the band, for the caterpillars are liable to leave their feeding ground in the neighboring forest and strip your trees after you have destroyed all of those in the orchard at first, as one of the best orchardists in the State knows to his sorrow. The caterpillars came in from a neighboring forest and cleaned off every tree. Whereas, if he had put the bands on he would have saved the whole.

EXPERIMENT STATIONS AND HORTICULTURE.

Prof. CHAS. D. WOODS, Director Maine Agricultural Experiment Station, Orono.

What I have to say this evening concerning Experiment Stations is little more than a compilation from State publications. I have drawn freely and without credit from the publications of the Experiment Stations and from the U. S. Department of Agriculture, to illustrate the lines of work the stations are pursuing in connection with horticulture. Before taking up such illustrations, a word explaining the origin of stations and their purpose is appropriate.

THE ORIGIN OF EXPERIMENT STATIONS.

Long ago an agricultural writer said: "Farming is the perpetual trying of experiments with soils, manures, and crops; with cattle and cattle food; with milk, butter, and cheese; with plows, harvesters, and harrows; with an almost endless list of things. The most successful farmers—those that get the most out of their land, their cattle, their crops, their fertilizers, their implements and their labor—are those who experiment themselves most industriously, most successfully and most intelligently, and who take the fullest advantage of the experiments of others. The best agriculture is that which, in old countries, on worn and intractable soils, has learned by long continued and varied experiments to make the gain of farming sure."

Once the farmer made the rude tools he needed for practice in his art; he now employs implements and machinery which can be made only with large capital and the highest mechanical skill and by men who make this manufacture a business. In like manner, the experiments which he can make do not meet his needs to-day. The research of finding out nature's secrets, the discovery of the laws which underlie the right practice of agriculture, is expensive of time and money. The more useful it is to be, the greater must be the outlay of money, labor and scientific skill. Within the past fifty years farmers and scientific men interested in farming have seen the advantage of using the

resources of science to improve the practice of agriculture and have established Agricultural Experiment Stations.

Established for the benefit of agriculture, and hence of the community at large, the most of them connected with educational institutions, where experience shows their work is most successful, these stations seek to answer the questions which agricultural practice is asking as to the tillage of the soil; the nature and kind of manures; the culture of crops; the food and nutrition of domestic animals and man; the production of milk, butter and cheese; the diseases of plants and animals, and in general whatever the agriculturist needs to know and whatever experimental science can discover.

The Station makes experiments in the laboratory, greenhouses, garden, orchard, field, stable and dairy. It is probably safe to say that there are few subjects which the farmer has to deal with in the tillage of the soil, the use of manures, the cultivation of his crops, the care of his stock, the management of his dairy, and the preservation of his crop of stock from insect pest or disease, that are not being studied by some of the agricultural experiment stations.

Nearly fifty years ago a company of farmers joined themselves together near the little village of Moeckern, near the city, and under the influence, of the University of Liepsic, called a chemist to their aid and later, with help from the government, organized the first agricultural experiment station. Liebig in Germany, Boussingault in France, Laws and Gilbert in England and other great pioneers, had been blazing the path of progress for years before. A great deal of research bearing upon agriculture had been and is still being carried on in the schools and universities, but the action of these Saxon agriculturists in 1851, marks the beginning of the experiment station proper, the organization of scientific research with the aid of government as a necessary and permanent branch of agricultural business.

This experiment station speedily commended itself so that in Europe in 1856, there were five experiment stations; in 1861, 15; in 1866, 30; and to-day there are more than 100 experiment stations and kindred institutions in the different countries of Europe. In each of these, trained investigators are engaged in

the discovery of the laws that underlie the practice of farming and in finding out how they are best applied.

So rapid and so sure has been the progress in this enterprise in both hemispheres, that private persons, educators, societies and governments have learned the usefulness and indeed the necessity of these institutions, not for the farmer alone, but for all who are dependent upon the products of the soil. The movement has extended so that there are to-day agricultural experiment stations on every continent, and in most of the civilized countries. There are experiment stations not only in Europe and North America, but in Asia, in Africa, in South America, and in Australia. It is impossible to form an estimate of the number of men that are engaged exclusively in this work of investigation, but there must be at least 3000 trained investigators studying in these agricultural experiment stations the various problems pertaining to the tillage of the soil, the care of crops, animal husbandry, horticulture and allied subjects.

The experiment station movement in Europe was nearly 25 years old before any experiment stations were established in this country. Storer, at the Bussey Institution, Johnson at the Sheffield Scientific School, and other pioneers in American scientific agriculture were laying the foundations. The demand for teachers in agriculture in land grant colleges stimulated education along these lines, but it was not until 1875 that any definite move was made toward the establishment of an experiment station. In that year, when the Connecticut legislature came together, Mr. Orange Judd, founder and then proprietor of the *American Agriculturist,* made a proposition to the Board of Agriculture, and through them to the legislature, that if the legislature would appropriate $2,800 for two years for an experiment station, he would personally give a like sum, and the Wesleyan University would place the services of their Professor of Chemistry and their laboratory at its disposal. The legislature accepted that offer, and thus the first experiment station in America began its work twenty-four years ago the first day of last month. This work justified itself to the agriculture of Connecticut, so when the next legislature met, in 1877, they made an annual appropriation of $7,000 for the continuation of the experiment station. The Connecticut Experiment Station thus

begun in 1875, has continued, and is to-day one of the best, as well as the first in point of time, of experiment stations in the country. This station proved so successful that the example was speedily followed elsewhere. In 1880 four were in operation, and in 1887, there were some 17 of these experiment stations in 14 states. Our own station was established by action of the legislature of 1885. Its object, as stated in the law, being, "for the purpose of protection from frauds in commercial fertilizers, and from adulterations in foods, feeds and seeds, and for the purpose of promoting agriculture by scientific investigation and experiment."

In 1887, Mr. Hatch, member of Congress from Missouri, introduced a bill which has come to be known as the "Hatch Act," whereby $15,000 per annum was appropriated to each of the states and territories which have established agricultural colleges or agricultural departments of colleges for the establishment and maintenance of Experiment Stations. This act called into existence very many new stations, so that there are to-day in our country over 50 agricultural experiment stations. These 50 experiment stations now employ upwards of 500 trained men in the prosecution of experimental inquiry. The appropriations by the United States government for these experiment stations is about $750,000 per year. The several states appropriate enough, either directly or indirectly, to make the total sum about $1,000,000 from public funds for the support of agricultural experiment stations. This may seem like a large sum to expend annually for agricultural experiment stations, but it is less than 10 cents for each of the farm workers of the country, and less than 2½ cents for each of our population directly dependent upon agriculture for their support, and less than 1¼ cents for each of the entire number of people who consume the products of our farms. The Experiment Station costs about five dollars a year for each million of dollars invested in agriculture. We are spending not far from 30 cents for every thousand dollars worth of products on our farms in the attempt to increase the value of these products in future years.

THE PURPOSE OF THE EXPERIMENT STATIONS.

The purpose of the experiment stations as defined in the Hatch act are as follows:

"It shall be the object and duty of said experiment stations to conduct original researches or verify experiments on the physiology of plants and animals; the diseases to which they are severally subject, with the remedies for the same; the chemical composition of useful plants at their different stages of growth; the comparative advantages of rotative cropping as pursued under a varying series of crops; the capacity of new plants or trees for acclimation; the analysis of soils and water; the chemical composition of manures, natural and artificial, with experiments designed to test their comparative effects on crops of different kinds; the adaptation and value of grasses and forage plants; the composition and digestibility of the different kinds of food for domestic animals; the scientific and economic questions involved in the production of butter and cheese; and such other researches or experiments bearing directly on the agricultural industry of the United States, as may in each case be deemed advisable, having due regard to the varying conditions and needs of the respective states or territories."

ILLUSTRATIONS OF THE WORK OF EXPERIMENT STATIONS

The experiment stations have studied, or are studying practically all of the vegetables and fruits which are grown in this wide land. While nearly equal attention has been given to the plum, the pear, the apple, the raspberry, the blackberry, the strawberry, the currant and the gooseberry, I have, because of its importance in our own State, selected some of the lines of work being done in the culture, growth, and care of the apple to illustrate the work of the experiment stations along horticultural lines.

COVER CROPS FOR ORCHARDS.

An orchard cover crop is a crop grown in the fall and winter to protect the soil and trees of orchards, and at the same time to improve the soil. Unlike crops grown throughout the season, cover crops as a rule do not injure the trees by drying out the soil, for in many places heavy fall rains are the rule, and even

where the weather during the fall is normally dry, the injury is less than in summer, since plants evaporate less from their leaves in the cooler weather and shorter days of fall than in the longer and hotter days of summer. Cover crops not only do not, as a rule, dry out the soil injuriously, but they also add directly to the moisture-holding capacity of the soil by the humus formed in their decay, and they hold much of the snow until it melts and is absorbed by the soil.

Another reason why cover crops are rarely as injurious as crops grown throughout the entire season, and are often beneficial, is that their growth is made after the trees have stopped growing and are maturing their wood for winter. The Michigan Station has shown that the majority of trees in that locality complete their growth by July. Of course the conditions observed in Michigan do not occur in all climates or seasons, but they show unmistakably the tendency of trees to make their greatest growth early in the season. Trees, therefore, require much less moisture in the latter part of the season than they do in the early part. Indeed, in moist localities it is often thought to be a distinct advantage to stop cultivation by midsummer and grow some secondary crop which will check the growth of the trees and cause them to mature before winter. The Washington Station, in studying the unusually severe freeze occurring in the fall of 1896, found that in most instances late summer cultivation had an injurious effect similar to late irrigation. "Wherever cultivation or irrigation had been kept up late in the season and the ground was moist and the trees in an active growing condition, there the frost did most damage."

Among other benefits to be derived from cover crops is the checking of washing and leaching of the soil. Light soils are often gullied by heavy rains in the fall, just as in summer, and some crop to bind such soils is beneficial. In the case of soil leaching and the consequent loss of plant food, especially nitrates, a crop is more valuable in the fall and early winter than earlier in the season, for in spring and summer the tree roots are in condition to take up much of the plant food as it becomes available; but from the time their leaves fall until the soil is frozen, the plant food which would otherwise escape in the drainage water, or be washed down beyond the reach of plants,

can be saved only by secondary crops, which grow until stopped by the severe weather of winter. Even in cases where the leaching of soils is not excessive a deep-rooting cover crop brings up plant food from the subsoil and leaves it near the surface to be used later by the trees.

Besides preventing in part the loss of fertilizing elements from the soil, cover crops may serve as a direct fertilizer. For this purpose the well-known ability of leguminous plants to take nitrogen from the air and store it, so that it can be used later by other plants, is made use of. The use of such crops in ordinary farm rotations is well known. That they may be equally useful in case of orchard fruits is shown by tests at the New Jersey Station. Crimson clover was sown in the peach orchard on sandy soil in the latter part of July, and the crop was plowed under in the latter part of the following May. The cover crop retarded to growth of the trees somewhat in the spring, but after it was plowed under they gained rapidly, and both wood growth and fruitage were more satisfactory than in the remainder of the orchard, which was fertilized with nitrate of soda. The use of leguminous crops, however, is not to be recommended in all cases. It often happens that soils become too rich in nitrogenous fertilizers, and the trees, therefore, grow too vigorously, do not mature their wood well, and are unfruitful. In such cases leguminous crops should not be used.

Cover crops may also improve the physical condition of the soil. In this connection the relation of humus to the water-holding capacity of the soil has been already noted. Humus is also beneficial in changing the character of very heavy soils, making them more porous and lessening their tendency to puddle in wet weather. Cover crops which live through the winter are of use in drying out heavy wet soils in spring so as to allow cultivation.

Cover crops may also be advantageous in protecting the trees and fruit. The Delaware Station reports lessened injury to fruit blown from the tree where the soil was covered with a crop of crimson clover. In the extreme North, cover crops are thought to be of advantage in preventing deep freezing and alternate freezing and thawing of the soil and the consequent injury to the roots of trees. At the Delaware Station

ground covered with crimson clover is reported as unfrozen when the temperature of the air was 14 degrees F. In some cases a cover may be injurious rather than beneficial to trees and fruit, through the protection afforded to insects, mice, etc.

To secure the best results with a cover crop that lives over winter, it should be plowed under early in the spring, while it is still succulent enough to decay rapidly. A crop plowed under late in the spring, after it has become more or less woody, will decay slowly, keep the soil too loose, and thereby serve to dry it out rather than retain its moisture. In many regions the crop may also do injury by the evaporation of moisture from its leaves if allowed to grow too late in spring.

[The speaker here mentioned in detail the work of numerous experiment stations, demonstrating the points enumerated.]

CULTIVATING VS. CROPPING ORCHARDS.

Whether orchards shall be cropped or given clean cultivation, how cultivation shall be done, whether it shall be continued throughout the season and similar problems, depend very largely on local conditions of soil, climate and the like. It is evident, therefore, that no definite rules can be given for the cultivation of orchards in all localities. The principles underlying successful culture, however, are the same everywhere, and therefore a knowledge of them will aid in deciding local questions.

Various experiment stations have conducted experiments to find out what methods give best results and why they do so. At the New York Cornell Station, it was found that the roots of trees only five or six years old have a greater spread than the tops. For instance, the roots of an apple tree in rich, cultivated soil extended eight feet from the trunk, while the entire top was not over eight feet across. Another apple tree in sod, with a top only six feet across, had roots ten feet long. A pear tree in poor soil had roots 21 feet long, while its entire top measured only seven feet across. The roots of an apple tree which had stood in sod since planting, were just beneath the surface of the soil, while the roots of those in cultivated soil were nowhere less than eight inches from the surface. These facts show that if orchards are to be cultivated at all they must be cultivated from the first, since otherwise the roots grow so near

the surface as to be injured by plowing and cultivation. They also show that to get the full benefit of cultivation all the space between the trees must be cultivated.

At the Nebraska Station a study was made of the effect of cultivation on the growth of apple trees, the size of fruit and the water content of the soil. A small orchard was divided into three parts, one of which was cultivated regularly, and the other two left in grass and weeds, one of the latter being mowed and the other pastured by hogs. The report says: "Trees in cultivated ground suffered noticeably less from the drouth and hot winds of summer than those in sod ground. The foliage was darker and more vigorous in appearance, and there was no yellowing and dropping of the leaves nor wilting during hot windy days, both of which occurred with uncultivated trees. Apples from cultivated land averaged nearly 14 per cent. larger in weight than those from pasture land, and over 17 per cent. larger than those from mowed land." The average percentages of moisture in the first 20 inches of the soil in the different portions of the orchard in the latter part of October were: Mowed portion, 14; pasture portion, 14.7; portion cultivated until August 1, 17, and portion cultivated the entire season, 20.4. The next season the results were practically the same.

The California Station has recently reported an instance of the beneficial effect of cultivation on the growth and fruitfulness of orchards. Apricots grown in adjacent fields under exactly the same conditions, except for cultivation, showed great difference in behavior. The soil of the region in which the orchards are located has a rather loose texture. One orchard was cultivated several inches deep, and the other was uncultivated. During one season the trees in the cultivated field made a wood growth of over three feet, while those in the uncultivated field made a growth of not over three inches. There was also a great difference in the fruit. The average percentage of moisture in the first six feet of soil was 6.3 in the cultivated orchard and 4.2 in the other one. A recent bulletin of the Illinois Station reports marked benefit from clean cultivation of an orchard.

The injury caused by growing grass in young orchards is shown very emphatically by an experiment conducted at the Utah Station. Parts of an orchard were seeded to alfalfa, tim-

othy, clover, and a mixture of timothy and clover soon after the trees were set, and other parts were cultivated, all being irrigated alike. Over half of the trees in the grass plats died and were re-set twice, while the cultivated trees lived and grew well. It is not to be expected that growing grass is young orchards is always as injurious as it proved to be at the Utah Station, yet the reported experiences of fruit growers and experimenters everywhere show the importance of carefully cultivating young orchards.

From the experiments referred to above it would appear that the growth of grass, weeds, and even such plants as field peas, through the entire season without cultivation, especially in young orchards, is to be regarded as an injurious practice.

Notwithstanding all this, it must not be inferred that clean cultivation is best in all cases. If the trees are set in fertile soil there is usually no injurious effect from growing a secondary crop between the rows while the trees are young and their roots do not occupy the entire soil, but the secondary crop should always be one that requires careful cultivation and does not evaporate moisture excessively, such as beans, peas, potatoes, cabbages, squashes, melons, and the like. The crops noted, and other similar ones, if not planted too close to the trees, do not hinder cultivation, and they evaporate comparatively little moisture. As an example of this, it has been shown at the Nebraska Station that in midsummer the moisture content of the soil of well-cultivated plats of cabbage, beans, peas, and potatoes, was but little less than that of cultivated fields in which no crop was growing. Such plants as squashes and melons may hinder cultivation late in the season, but that is usually not a disadvantage, as shown later. As the trees grow the crops should be planted farther from them until the tree roots occupy all the ground, when it is usually best to discontinue growing secondary crops. Orchards with trees set twenty feet apart should rarely be cropped more than three years, but apple orchards can often be cropped for seven or eight years. When the trees begin to bear it is usually time to stop cropping the orchards.

Aside from the growth of secondary crops in orchards, there are other cases where clean cultivation is not best. It often

happens that in very rich soil or in very moist localities fruit trees grow vigorously, but do not fruit well. It is then necessary to do something to check the growth and induce fruitfulness. This may often be accomplished by seeding the orchard to grass. How long grass should be allowed to remain can be determined only by the growth, fruitfulness, and appearance of the trees. If the growth becomes very weak, and the leaves are light-colored, it is an indication that cultivation should be resumed. Indeed, it should have been resumed before these conditions appeared.

THINNING FRUIT.

Thinning the fruit of trees that have a tendency to overbear is recommended very generally and practiced very little. Few extended experiments in thinning fruits have been reported by the experiment stations, but where thinning has been followed systematically for a number of years in commercial orchards, it has been found profitable.

The number of fruits produced per tree may be regulated in two general ways: By pruning away a part of the branches to prevent the formation of too much fruit, or by picking off the superfluous fruits after they have formed. With such fruits as grapes, raspberries, blackberries, and the like, the former method is employed almost exclusively. An experiment reported from New York Cornell Station indicates that in the case of blackberries and raspberries, no means of regulating the number of berries per plant is necessary other than the annual pruning.

Among orchard fruits, perhaps none need thinning as much as Japanese plums, except, possibly, peaches, which, in commercial orchards, are thinned more systematically than most other fruits. It is reported that in favorable years the fruits of Japanese plums set so thick as to hide the limbs. In fact, the tendency to overbear is considered by some to be one of the greatest faults. Thinning the fruits of these plums has been favorably reported on by the Alabama College Station. The size of the fruit was increased noticeably by thinning.

The tendency to overbear is also seen in varieties of native plums, as is shown by an experiment with the Gale seedling

plum at Wisconsin Station. About four-fifths of the fruit was removed from a portion of the tree, leaving the fruits about two inches apart on the branches. The fruits on this portion of the tree were considerably larger than on the unthinned portion.

The Massachusetts Hatch Station has reported the results of an experiment with apples and plums. A tree each of Gravenstein and Tetofsky apples was thinned on July 1, and a similar tree of each variety left unthinned as a check. In case of the Gravenstein, the yield on the thinned and unthinned trees, respectively, was, first quality fruit, 9 bushels and 2½ bushels; second quality fruit, 1 bushel and 2½ bushels; windfalls, 9½ bushels and 10½ bushels. In case of the Tetofsky the thinned tree gave one bushel of windfalls, and the unthinned tree 3 bushels; of second quality fruit the yield was one-half bushel from each tree; and of first quality fruit the thinned tree yielded 2 bushels and the unthinned tree none at all. Allowing 60 cents per bushel for firsts, and 25 cents per bushel for seconds, the market value of the thinned Gravenstein apples was over twice as much as that of the unthinned, and if the thinned Tetofsky apples, eleven times as much as that of the unthinned. It cost 48 cents to thin the Gravenstein and 35 cents to thin the Tetofsky. The net gain due to thinning was 85 cents for the Tetofsky and $1.85 for the Gravenstein. It is thought that the results would have been more pronounced if the thinning had been done two weeks earlier.

The results with plums were similar to those with apples, as regards the increased production of fruit.

The advantages claimed for thinning orchard fruits are about as follows: Thinning increases the size of fruit, gives it more color and a better flavor. It diminishes the amount of worthless fruit, windfalls, etc., increases the amount of No. 1 fruit, and in some cases increases the total yield. It lessens the amount of rot, especially in the case of peaches and plums, since the diseases can spread less easily where the fruits do not touch each other. Thinning also tends to keep injurious insects in check, as care is taken to remove the infested fruit.

[The speaker then called attention to the leading insect and fungous pests of the apple, and the work which has been done

by the experiment stations in studying life histories and devising means of extermination. Among those mentioned were the apple curculio, the apple maggot, bud moth, tent caterpillar, borers, apple and pear blight, apple scab, apple rust and bitter rot and others.]

In the above I have attempted to outline some of the work which is being done by experiment stations in our country for the growers of the apple. If anything like a full list of the lines of work which are being taken up and the results which have thus far been obtained in apple culture were to be presented, I should have wearied your patience more than I already have. While in view of what there is to be learned, it would seem as though very little had been accomplished by the experiment stations, yet when one attempts to get together for a paper like this even a catalogue of what has been done along this one line, the amount is very great; and when it is remembered that important as is the apple, it represents only one of many fruits, and as important as pomology is, it is only part of the much larger subject of horticulture, the work thus far done is very satisfactory.

The work of the station goes on, ever increasing in amount and value, from year to year. Most of the agricultural experiment stations of the country were established in 1888. When another decade shall have passed, it is not a rash prediction to say that fourfold as much will have been accomplished as in the past decade.

WINTER MEETING.

NEW GLOUCESTER, JANUARY 18 AND 19, 1900.

A special meeting and exhibition was held as above, when the following papers and discussions were presented:

NATURE STUDY IN THE HOME.

MRS. V. P. DECOSTER, Buckfield.

To make a success of any business a person must like it, must have some inspiration and attraction for that business. Agriculture, more than any other calling, offers a broad field of study, and experiment. It would naturally seem that our country schools, where the scholars are surrounded on every hand with the best of material for study, should be the pioneers in Nature studies. Unfortunately, however, such is not the case. In our city schools you will find the children drawing from leaves, flowers and stuffed birds. They have cabinets filled with specimens for the study of Geology, Mineralogy, Entomology, Botany, etc., while in our country schools, where these specimens can most easily be obtained, they are seldom found, and but few teachers are capable of teaching them.

Until we have these studies taught in the rural schools, every father and mother should constitute themselves as teachers, even though they be learners themselves. The love of nature is not wholly a natural one, but is largely educational. When walking along a public street you may meet many strangers who will have no particular interest for you; but let a mutual friend introduce you to some of them, and then tell you about their homes, work, habits, characteristics and families, and the next time you meet any of them you will feel an immediate attraction. You will stop with a smile and a greeting and experience a feeling of pleasure. As your acquaintance progresses you will seek their homes, study them and their relatives, and if they are worthy, learn to love them. It is just the same with birds, plants and minerals. One may live among them all

their lives, but without study or even a first introduction, will never love them. The commonest flower by the roadside is of interest when you know its name, family and habits.

A little toddling child will pick violets and buttercups by the roadside, pleased with their color and fragrance, but as he grows older this is not enough to hold his interest. The flowers soon become common weeds to him, unless he studies deeper. As I said before, introduce them; tell their names, families and peculiarities. Make them personal friends, visit them in their homes and invite them to yours. What a child learns under seven years of age, goes far to form his taste and inclination for a life occupation.

Of course we do not wish to make farmers of all of our boys. I believe in watching for a child's natural abilities in every direction, but Nature Study is a grand help in every path of life, and a person surely can never make a success of agriculture without Nature Study. Teach children to use their eyes and brains and seek for little peculiarities. Unless a child can see and think for himself, he will never remember much that is told him, but if the parent will tell him enough to create an interest, then he will watch and study alone.

But many parents may say—"How can I teach what I have never been taught, or taken an interest in myself?" Begin as a child, with the children. We parents are too old! We must renew our youth. We are too busy! We must take time to play. We stay indoors too much! Let us go down to the brook. Life is short! Let us get the best good out of it. "Except ye become as a little child ye shall in no wise enter the kingdom of heaven." Many ministers have given us many explanations of that text. I have found it to be a most delightful heaven to get to the brooks and woods with the children and be a child with them, close to nature's heart, for nature's heart is God's heart.

It is rather slow work to study in a haphazard way, without any particular aim or method, and much valuable time is lost. Even though there are many excellent books at a low price, upon such subjects, few parents know what is best to purchase, even if they have a desire and money with which to buy. They cannot leave their homes, work and families to attend an agricultural

college; it takes all of their time and strength to earn a living, clothe their children and send them to school. They expect the schools to furnish the required knowledge. I was once talking of this very thing with an acquaintance who was a superintendent of a normal school, and I lamented the fact that we had no kindergarten schools in the country. He answered, "Your children, upon your farms, will get a better kindergarten training than any they could get in a city." I did not believe him. I had much work to do, like all busy mothers, and felt a little guilty to leave a floor unswept and dingy windows, to go into the woods with the children, but as they grew older and I saw how they remembered the names and habits of the birds and flowers and butterflies whenever I took time to go with them, I began to understand what that teacher meant. The knowledge they gained from living things out under God's blue sky, was worth far more to them than learning to use worsted, braid colored straws, and fashion paper boxes. But we have always been hampered for lack of reference books, and some aim or leader in study. Quite recently, however, I have learned of something which I believe is going to open up a most delightful and helpful course of study. It is a free course in Nature Study or any branch of agriculture, by correspondence, for both parents and children. This has been conducted for several years at the Cornell University Agricultural Experiment Station, Ithaca, N. Y., and a similar course has more recently been opened by the Experiment Station at Kingston, R. I. The directors advise what books are best to study for different branches, and members of the school can purchase them of the publishers at quite a discount from regular prices. The college also issues monthly or quarterly bulletins and lessons, while questions and directions are freely exchanged by mail.

Now for a few practical suggestions for mothers in teaching these Nature Studies at home. For germination, the best object lesson is to lay a thin layer of cotton batting upon a tumbler of water, place two or three beans upon the cotton and lay a little more cotton on it. The beans will soon swell and the process of germination can be plainly watched. By changing the water occasionally the vines will often grow two feet and blossom.

From now on is a good time to gather alder, maple, cherry, apple and willow buds and have the children watch them open. Don't mind if the sticks do look rather homely and clutter the house. Plan to have apple blossoms for Easter. Bear in mind, when forcing fruit buds, to procure branches at least ten inches long and break off the leaf buds and the smaller blossom buds, only leaving a few of the strongest buds on the terminal end. The whole plant will concentrate its strength upon those few buds. Pears, cherries and crab apples can be forced in from two to three weeks. Another good plan is to transplant in the fall several plants of the early spring flowers into a box and keep it in some cold place till the latter part of winter and then bring them into the house for forcing.

In studying flowers with children, a very valuable book is Mrs. Wm. Starr Dana's "How to Know the Wild Flowers." This is full of good illustrations of many of our wild flowers, so arranged that any child who can read, can easily find the picture and description.

In studying seed formation and plant germination a mother has the most beautiful object lessons by which she can teach children sex and reproduction in both the plant and animal kingdom, in such a way that they will see God's laws working the same through all nature, and the things which seem a vulgar mystery to the ignorant child, will be to them a simple, pure, and natural law.

I believe a child can gain a broader education while playing about a little country brook, than from any one educational book ever published. The six inch brook trout will look larger to the boy of ten, than the six pound Rangeley lake trout to the man of forty. The rushes, mosses, and ferns that line the banks of the brook will look richer and more luxuriant than any tropical growth of Porto Rico or the Philippines which he may visit in after life.

The gentle ripple and splash of the water over a stony bed in summer, or the rush and roar of the swollen stream in spring, will recall fond memories as long as life may last. But with all these things, his enjoyment will be keener, purer, and more lasting, if there is a guiding mind or teacher to answer his questions,

to call his attention to laws governing these things, and if he has books for reference.

When you were boys, you found in the bed of the brook, a peculiar little worm encased in a roll of bits of bark, sticks and sand stuck together. It made fairly good fish bait, if you had no angleworms, but did you know what it was; or how it came there; or that it would soon change into a dainty Caddice fly? Did any one ever call your attention to some ugly looking black bug crawling about among the rushes of sluggish water? And would you ever have thought of watching on till he crawled up some stem into the sunshine, where his skin split open and out came a brilliant dragon fly, with great gauzy wings; or did you simply call it a "devil's darning-needle" and run away for fear it would sew up your mouth? You probably found the wonderful leaves of the pitcher plant in the meadows; but did you study it closely enough to learn that what appeared to be a generous offer of drink to thirsty insects, was in reality a most wonderfully contrived deadly trap, for a carniverous plant; and that the beautiful leaf of the sundew was a similar trap for the insects?

When you played on the ledge in the pasture, if you noticed the scratches and grooves on its surface, did any one tell you of the great ice mountains that swept over this country ages ago, and left those scratches? And when your father scolded about the rocks on his farm, did he lay it to those same glaciers leaving the boulders there; and making the soil what it is? And when you lifted your heel to crush many an ugly worm, did you know you were killing beautiful butterflies as well as injurious moths?

The other day I called upon a friend on the top of Goff's hill in Auburn. As I was coming away, I noticed upon a branch of a cherry tree close by the piazza a brown bunch about three inches long and perhaps an inch and a quarter in diameter. "Oh!" I cried, "Here is a Cecropia chrysalis, do you care for it? May I have it?" "Certainly you may have it," my friend replied, "I noticed that there the other day, and said that there was something growing on that tree, and I must burn it up. I don't know what it is." And so she broke off the small branch and I carried it in my hand all the way home, so delighted with my treasure, that I had nearly reached Buckfield before I remembered that I had left my purse at her house. Now she had a

bright little girl that would enjoy the beauties of that wonderful moth which is sleeping inside that brown cocoon as well as my children, if she were only taught.

Four or five years ago, when I began the study of entomology with my children, I did not know the name of a single caterpillar or butterfly, but the last two years have been exceptionally good ones for studying a few kinds of caterpillars. Nearly every one has such a dislike to caterpillars that this would not, at first, seem a very interesting study, but we have found it extremely so. It is surprising how many kinds there are, as soon as one begins to watch them. Not only my children, but the men of the family, and even the neighbors, when they find a peculiar caterpillar bring it to me. These can be easily watched in the house by placing them under a screen or glass, or in a glass jar. We often have several varieties under wire fly screens. Each caterpillar has its own particular variety of food on which it feeds, so it is necessary to notice upon what plant it is found feeding, and keep it supplied with fresh leaves of its kind until it enters the pupa state. When they are ready for this change they stop eating and anxiously crawl about their cage as if searching for something. For those varieties which enter the ground for their transformation, a box of earth should be provided. Other varieties roll themselves inside of leaves, or spin a cocoon in some corner. Still others, like the Asterias, Antiopa, Atlanta, and Archippus, suspend themselves from some object.

I have already taken so much time that I will not begin upon flowers, minerals and birds, which are equally interesting if not more so. If you once begin the study of any of these branches, you will be surprised to see how interested you will soon become and how the knowledge seems to be lying all about you, only waiting to be appropriated.

If you begin with minerals, your friends will learn of it, and give you specimens. Neighbors will tell you of something interesting upon their farms. You cannot take a walk, or go near a ledge or stone wall, without seeing something interesting.

If you begin the study of birds, there will be the same attraction. You will see new birds, hear new notes, and find nests which you never saw before, although there have been the same about you for years. There seems to be a law of mind attrac-

tion which calls to us those things with which our mind is filled; or rather, which opens a sight which has been lying dormant.

I do not see how any one can be a true lover of nature without being a Christian! Will you just peep into a church I know, for a moment? Come up through the pasture to the top of the hill where the great pines grow. Let us go in by this old wood road. Bare your head as you come down the aisle. All of these great pines stand here silently, worshiping. Under your feet is a beautiful carpet of pine needles, traced with arabesques of trailing evergreen, a hidden choir of birds is praising God with sweetest song. The soughing of the winds in the tree tops rolls over you in mighty waves like the tones of some great organ in a vast cathedral. But the sermon comes straight from God. You must still your ears and very thoughts, and the Spirit within you will whisper thoughts no man could ever say. You will feel your very soul grow stronger and know that you are in the presence of the Infinite.

THE APPLE IN COOKERY.

Miss Anna Barrows, Boston.

(Abstract.)

[Abstracts of other lectures by Miss Barrows are to be found in the reports of this society for 1892, 1893, 1894 and 1895.]

A few years ago some explanation seemed necessary when a lecture on cookery or domestic science was added to the program of any agricultural meeting. Now, this is a common occurrence, and in farmers' institutes all over the country questions pertaining to the home life, and to the consumption as well as the production of foods, are generally discussed.

Surely it is desirable that the consumer should be educated to discern the finer points in the quality and flavor of different food products. If the producers also would more carefully study this phase of the question, ultimately they would have larger demands for their crops. Many varieties of fruits and vegetables are raised merely because they are showy, and will bear rough handling in t ısportation, and little regard is paid to their quality and flavor for the table. The prevalence of such

articles in our markets naturally prejudice buyers against this class of foods as a whole.

There is much yet to be learned about the adaptation of different varieties of apples to the different processes of the kitchen. Some apples are best suited for baking, others for certain kinds of pudding, and still others for sauce and pies. But to the average consumer, an apple is an apple and the quality and flavor of apples for cooking are rarely considered. "Cooking" apples like "cooking" butter are wholly undesirable; we better use less and let that little be of good quality.

The quality of eating apples on sale in our railroad stations, restaurants, and fruit stands is not above reproach, and fruit growers should make it their business to buy samples from such stands and demand that better varieties be offered the public. As a rule good apples are less common and full more expensive than the oranges and bananas, which are offered the travelling public. This state of things, of course, is not favorable to the apple grower.

Before proceeding to the cookery of any food product, we do well to study its chemical composition and from that we may learn how to combine it with other food substances. The analysis of the apple given by Professors Atwater and Woods in bulletin No. 28, of the U. S. Dept. of Agriculture, Office of Experiment Stations, published in 1896, gives the composition of the average apples as purchased, from ten different analyses as follows:

Refuse	25
Water	61.5
Protein	.4
Fat	.4
Carbohydrates	12.4
Ash	.3

The edible portion of the apple, in an average of ten analyses, was as follows:

Water	82
Protein	.5
Fat	.5
Carbohydrates	16.6
Ash	.4

At first it might seem that any substance containing so much water had little food value, but it must be remembered that the human body is at least two-thirds water and therefore our foods should be mainly water. When we notice the minute quantities of protein and fat present in the apple, we readily understand why we so often combine cream and custards with apples in puddings. Moreover, the carbohydrate portion being mainly sugar, it is also reasonable to use apples with starchy materials as is done in rice and tapioca pudding, apple dumplings, etc. Doubtless the chief dietetic value of the apple lies in the variety which it enables us to give to the cereal products which, of necessity, must be the main part of our diet, and to the valuable mineral salts and acids which it contains. There are many old proverbs to the effect that "It will beggar a doctor to live where orchards thrive." When we know more about the cookery of apples, and kindred fruits, and use them more largely in our daily diet, perhaps the patent medicine venders will not reap as generous harvests as they now do. Many barns and fences, as well as the country papers, throughout New England, bear witness that manufacturers of patent medicines find it profitable to advertise their wares in country communities.

More should be done to preserve the abundant apple crop of one season for the next when the supply will be scanty. Jelly making should not be left to the city manufacturer wholly. Too often the dried skins and cores of apples from the country canning factory are boiled out in the city establishment, and by the addition of artificial colors and flavors this substance is put upon the market as currant, quince and every other known variety of jelly. Might not an honest apple jelly be made where the apples grow at a fraction of the cost of these shams?

For many puddings it is desirable to stew the apples without removing skins and cores unless these portions are imperfect. The seed gives an agreeable flavor and the skin imparts a bright color. When thoroughly cooked all the soft pulp can be rubbed through a strainer and used in a variety of ways. It may be combined with gelatine or custard or whipped cream in very elaborate desserts, or simply mixed with any cereal. Such pulp is sometimes put into bread or muffins.

A most attractive way to prepare apples with bright colored, tender skins is to core them, without paring, and cook slowly in a syrup made of equal parts of sugar and water until they are perfectly tender, but not broken. The spaces where the cores were, may then be filled with jelly or a mixture of chopped nuts. Or each apple may be placed on a round slice of sponge cake and the whole garnished with thick whipped cream.

Baked and fried apples should be served with fat meats more frequently than is commonly done. In this case an omelet will be garnished with rings of fried apple.

A quick dessert is a variation of the old time apple duff or apple dumplings. The apples should be stewed in a thin syrup until they are tender, then dumplings made as for a meat stew are dropped all over the surface of the hot stewed fruit. The saucepan is then closely covered and allowed to cook rapidly for ten minutes, then serve dumplings and fruit together with cream and sugar. This dish is a good illustration of the way in which we manage to combine the food substances needed in a daily diet. Mineral matter in minute quantities is found in all. Water is present also in greater or less degree; the flour from which the dumplings is made furnishes starch and some protein, while the cream gives us more protein and considerable fat. Where such a dish is served after a meat dinner no more protein would be necessary, but the quantity could be increased by adding beaten egg to the dumpling.

[While speaking, Miss Barrows indicated in a practical way the method of preparing the various dishes mentioned and at the close of the lecture those who chose to do so were given an opportunity to sample the productions.]

CURRANTS AND GOOSEBERRIES.

R. H. LIBBEY, Newport.

(Abstract.)

Profitable small fruit growing must ever remain in the hands of those who love the work. There are intuitive faculties and perceptions, as well as enthusiasm and study, necessary for success, and only a small per cent have that appreciation, or are willing to give that study, which alone will sustain effort year after year.

Much also depends on the variety grown, for the best are none too good. For gooseberries, I prefer the Downing for a market berry; they are large, attractive, and prolific bearers, but would recommend the setting of a few Industry and Smith's Improved. The Red Jacket is highly recommended, but with me, thus far, has not been a success. For profit, the gooseberry is as good a berry as I know of, the bushes have been known to bear for twenty years and yield a good crop when properly trimmed and cared for, and the fruit always finds a ready market. In 1894, I set one hundred and fifty bushes and in 1895 they bore one quart to the bush. In 1896 they bore five quarts to the bush, in 1897 ten quarts to the bush. I have picked seventeen quarts from one bush.

The currant comes along partly with the raspberry and follows it for weeks; indeed none of the small fruits will remain so long upon the bushes without injury as will the currant, and since the introduction of the newer varieties, and the easy way of destroying the currant worm, this fruit is attracting more attention than ever before. If remuneration is the object with fruit growers, they certainly can find it in the currant and gooseberry.

From recent minutes of the horticultural society, it appears that Dr. Cannon of Geneva, from 1-16 of an acre, sold 15 bushels of currants, besides what was used in his own family, and his crop was estimated at 250 bushels to the acre, but an average of 150 to 200 bushels is an excellent yield. It is evident, therefore that if properly cultivated, large profits are sure. In naming varieties, I should place Fay's Prolific at the head of the

reds, and Lee's Prolific at the head of the blacks. The currant and gooseberry require about the same cultivation, are infested with the same insect enemies and require the same kind of treatment to destroy them. I use as a preventive, London purple or Paris green, applied before the fruit sets. If you begin its use as soon as the leaves become visible, there is not much danger of the worms injuring your bushes. Should you discover worms later, white hellebore in the proportion of ¼ pound to 16 gallons of water, applied with a spray pump, will check the ravages. After my berries are picked, I spray again to prevent the worms from working on the foliage.

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While the growing of currants and gooseberries calls for care, skill, application and a study of the habits of the bushes, for clean cultivation, good mulching and fertilizing, no man can succeed who does not appreciate the importance of marketing in the right manner and at the right time. Never sell immature fruit. You simply destroy the taste and desire for a good article. The demand for gooseberries has been seriously checked by the attempt to force immature, undersized and necessarily bitter berries on the market. Mature your fruit by the best of attention, ship only perfect berries of full size, give full measure, and your customers will come again and again. This is the way to make the growing of currants and gooseberries profitable and yearly increase the demand for this luscious fruit.

RASPBERRIES AND BLACKBERRIES.

E. P. CHURCHILL, Hallowell.

(Abstract.)

Raspberries and blackberries will live in almost any place in reasonably dry soil, though the raspberry does well in its wild state in very damp soil.

Land suitable for corn has long been a standard guide to grow the two species but it seems to me one very important point has been overlooked; where dressing is broadcasted we may expect many sucker plants, remote from the hill or row. Now we can overcome this very much by furrowing deeply and using the dressing in these furrows as the plant will readily find its food.

Manure applied in the row will produce more fruit, and stronger plants, with far less work, with much less dressing, and I will say, less weeds and grass, than if applied broadcast.

It is the general practice to let the old growth remain until the next spring, or at least many do, but I prefer to cut out the old canes just as soon as possible after fruiting, for several reasons. The new plants will become more stocky, will ripen up far better and the rows need hoeing and working; the latter should be done without delay. I want to say here, one of the best tools to cut out canes with is a narrow spade; have it sharp; take a scythe-stone along and keep it to a keen edge. One can cut the canes close down.

Until recently I have left my plants standing through the winter, but the last two seasons have laid them all down, not by burying the tops (except the black raspberries), but by looping them together, bringing one top in by the lower part of another, and so on, making binders thereby for others. Many small plants can be held down, being under larger ones. I find it pays even to tie many with strings. With a season like the last I much prefer getting them down early, as there was a late growth caused by rains after the drouth, and plants laid down will ripen the wood sooner than if left standing.

In spring the plants should not be straightened up at once, but after a few days they will come up very much and will bear

assistance. Then about one-third the top should be cut off, care being taken not to work deep near rows, after the first season.

Fertilizers should be applied early in spring, even before plants are straightened up, and it seems to me ashes are excellent. A little salt or fine bone, especially on dry soil, is good. All the above applies to both raspberries and blackberries.

I have until the two last seasons cut the black raspberries off when, say, two feet high, before fruit season, but I have made an improvement in allowing them to grow, and as soon as fruit is off, cut out old wood, swing the stool plants round all one way and tie to each other, then cultivate in the spaces thus made, and in September bend the plants down close, and a whole hill together and cover a foot or more of tips. In spring I raise them up about four feet and, if in hills, bring the tops of two together, forming an arch, then an open space. I find I get more fruit and the bushes do not feel the winds nor are they in the way so much as in the old way, and above all they winter far better. It would seem, bound thus, as though there would not be room, but the laterals will come out in a wonderful manner and rejoice one's heart with plenty of the largest fruit.

All of the tip-rooting sorts are sure to do better if set in a depression not covered full depth at first, unless old plants, for a young plant is easily smothered if covered as we do the red sorts.

VARIETIES.

The Turner I have fruited for several years, but have discarded. The berry was too small and too soft, though the canes were free from thorns (a good feature) and among the hardiest.

The old standard, the Cuthburt, I still grow, it being productive, of good size, etc., yet not as hardy as the Turner. By proper laying down and fertilizing, however, it will please all.

I have increased the Loudon as fast as possible. I find it a fine sort in all respects. In bush it resembles the Turner, smooth and clean and very stocky; fruit large and abundant even on small plants. In the future I shall plant only this sort for reds, unless it be the Marlboro, which I find an excellent very early sort.

I have a few of the All Seasons, which is, as a whole, a fine thing. It will give us fruit as a surprise, large, red, and of fine flavor; plant short and stocky, of peculiar color, very hardy.

I planted a few of the Royal Church, which I have discarded as almost worthless. It resembles the old Clark, crumbly, and has not many good qualities, anyway.

The Columbian, (a cross between red and black) I find a remarkable fruit, more prolific than the Shaffer, and the berry is firmer, not quite as dark in color, and good enough to induce one to bestow extra care on the plants, as they are not perfectly hardy, but if allowed to grow uncut and laid down close, they will astonish the grower.

The good old blackcap, Gregg, is a favorite sort with me, very large and firm and as productive as one could desire, good enough raw or canned, cooked or dried; plants not perfectly hardy, yet with care and proper treatment will give good satisfaction.

BLACKBERRIES.

Years ago, I grew the Snyder to quite an extent, but the berry was small and the canes were so apt to break off at the crown and were so uncomfortable on account of thorns, I discarded it. Something better I find in the Agawam and the Wachusett thornless, so-called, both excellent in every respect.

I want to caution all as to the extolled Oregon Evergreen blackberry. I have worked three years on one plant and have to say, let it alone. Of all the thorny things it is ahead; regular hooks clear out on the leaf stems and the fruit is small and late, while plant is tender. It killed in spring after I removed the covering. My experience and 50 cents for one plant say let it alone.

The raspberry-strawberry is of no use, at least four years' experience has not proved it of any value whatever.

Something new: I wish to call the attention of the society to something peculiar. For a few years I have found many raspberry roots with enlargements, some as large as an egg, often two or three on one plant. The old plantations taken up were worse than plants of more recent setting. I am not able to tell whether it is a fungus or what, nor do I know as it was a detri-

ment to the plant. Nothing of the sort has ever come to my notice before.

[Mr. Churchill's raspberries are evidently troubled with the root gall (*Rhodytes radicum*)and all affected plants should at once be removed and burned.—W. M. M.]

STRAWBERRIES.

E. W. Wooster, Hancock.

DOES CLIMATE AFFECT TIME OF MATURITY?

Under the above heading I saw an article in the American Gardening, on page 848, December 16, 1899, written by C. W. Benson of Alvin, Texas; I here quote from it:

"I have noticed that plants shipped in here from the North commence to fruit two or three weeks earlier than the same variety, which has been grown on our grounds for three or four years. Conversely, it may be possible that our plants, among the late varieties, may be as much later when transplanted to the North, and that this characteristic is retained for at least two years.

"It is probable, therefore, that the picking season in a great many localities might be nearly doubled, by shipping in early plants from a more northern latitude, and late sorts from the South every two or three years, or until they have become acclimatized."

Now there is not the least doubt that Mr. Benson is on the right track of a "happy hit," at least, as far as the Southern fruit grower is concerned; for every farmer should know that that class of vegetable life which has the ability to adapt itself to climatic conditions is greatly affected by season's influences in hastening or retarding the time of maturity, and that this influence will last for two or more years.

Take, for instance, our Indian corn; every enterprising market gardener of the South knows the value of northern grown seed of early varieties over his home-grown stock. Where can you find a vegetable life with greater powers of adaptability than the strawberry? There is not a state or territory in the Union

where the strawberry cannot be successfully grown. While this is true, it is not saying but what it will flourish better in some than in others. It will flourish best where its requirements are most closely met. That stands to reason. We can not compete with the southwest central states in the production of corn, except, perhaps, in these western counties with sweet corn for canning, because climatic as well as other influences are more favorable for the production of this vegetable in those states. Corn requires hotter weather than the greater part of Maine can give to do its best. From 90 to 100 degrees is all right for corn, but it is 20 degrees above the requirement of the strawberry.

The strawberry, as far as the growth of the plant is concerned, if furnished plenty of water, will flourish well in the South; but where perpetual summer reigns it will not fruit well unless the growth is checked in some unnatural way.

The strawberry must pass into, at least, a partial state of dormancy before it can mature fruit-buds. The most natural way is by a low temperature, the least natural way is by drouth. In the far South the latter must be the way. In certain sections of the North, the most natural, and thus the most healthful way can be found.

The strawberry is a cold-blooded plant, and will grow at a very low temperature, in fact, at all times when the ground is not frozen, even though covered with several feet of snow. But the growth of the plant at this time is almost wholly confined to the roots and crowns, augmenting the fruit-producing powers of the plant.

This winter growth is much dependent upon the presence of green and healthy foliage, and unless this is preserved intact by proper covering, as freezing weather approaches, very little improvement can be seen.

When the foliage has been removed from the plant by any cause which has not destroyed the roots and crown, its first efforts are all along the way to repair the damage that has been done, because the production of fruit is impossible without foliage. If you mow off, or burn over, a strawberry patch without injury to the crowns, you will never see a sign of a fruit-bud till after they have regained a strong foliage; but let a drouth

attack a patch in full foliage, fruit-buds will at once begin to form, and if the season is long enough, the result will be a second crop of fruit.

One should easily see from this how our northern grown plants, when set in the South, produce earlier fruit than the same variety that has been acclimatized to the conditions of that climate. First, because our plants are stronger, being developed under more favorable conditions as far as the summer influences are concerned; second, by greater fruiting tendencies, being developed by a longer period of partial dormancy; third, because more susceptible to the influence of heat.

VARIETIES AND IMPROVEMENT.

Varieties of strawberries, like all other fruits, regardless of favorable seasons, will have their off years in fruiting; and I have noticed that on the off years of the usually productive varieties, those varieties that have been only moderately productive most seasons then make their best showing. Before we had so many good staminate sorts, some five years back, I planted more largely of the pistillates; for a time all went well, but when there came two wet seasons, just at the blossoming period, matters did not go so well. With so many good staminates of all seasons as we now have, I do not take chances by planting largely of the pistillates. The pistillates are never as reliable on a wet season as the staminates.

All varieties, no matter how carefully propagated, will in time run out. All perfect life, combining sex, produces seed. This seed was produced for the purpose of perpetuating its species. No new life can be produced except from seed. All other methods of propagation are auxiliaries to enlarge or multiply life.

Now I come to the befogging question: Can we properly apply "pedigree" to plants propagated by runners without greatly muddling matters? The definition of "pedigree," as I find it, is: "Line of ancestors." Now is there any line of ancestors formed by this method of propagation?

Let us see. Runners which are thrown out from plants, after they get to a certain length, form new plants, but remain attached to the main plant till they have become well rooted.

If these runners are detached as soon as formed, the plants will be formed on the stool of the old plant and remain parts of that plant. They are just as much parts of that plant, in reality, if allowed to grow and root in their own way.

It stands to reason if there is any difference in the fruiting powers, formation, color, quality or size of the fruit of these several plants thus formed, save from the advantage given by earlier rooting, it must be of a local nature and thus can have only a local effect or influence. Every one of these plants of equal age was designed by Nature to be of equal value for propagation purposes.

Now we come to the most vital question: Can we improve our fruit stock by selection further than to select for health and strength, except through seed? Here is my answer to this question: Imagine that I hold here between my thumb and finger the tiny seed of a strawberry, incased in a hard shell, which is more easily ruptured after it has been frozen—clearly showing from the very start the climate best suited for its development. Within that tiny case, sealed up, in the embryo, is a strawberry plant and its fruit, but in the plant and its fruit must be a consideration for the future. Within that little case, so to speak, are all the plans, drawn by that greatest of all Architects, and all the tools necessary to build and model the future plant and its fruit; the mixing pots for the coloring, the brushes and all paraphernalia, is all, all there; and when the work goes on, it must at all times be under the watchful eye of that great Architect. Is there any reason for us to doubt that if all proper material is furnished and conditions favorable, the highest degree of perfection possible will be the result? Is it within man to improve upon the plans and labors of Nature? Man was made to serve Nature, not to be her master; her pupil, not her instructor.

But Nature is a very indulgent mistress. She understands well the caprice of man, and seeks to satisfy it in every reasonable way. She will allow man to assist her in many ways, but she will not allow him to dictate to her how she shall do her work, how much she shall do, or how long she shall be in doing it.

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These are complicated questions; they are no less important questions, for upon their correct solution and correct following hinges much of the success of fruit growing. It is very necessary that we should understand them and understand them correctly, that we may follow the correct methods of fruit improvement.

While these questions may seem complicated, as we undertake to solve them by considering only one special group of life, much of the difficulty is removed when we consider them in connection with all life; and that life governed by one collective law. As we can better understand the workings of the laws which govern those lives of a higher order, we have only to apply the same to those of a lower, in order that we may better understand them also; and as we more closely study these universal laws of life, we not only grow wiser in that wisdom that better fits us to perform the duties in the business department of our lives, but infinitely wiser in that wisdom which more fully comprehends that the world is truly His and that He made it.

Please imagine again for just a moment that I am holding that tiny strawberry seed. Within it, in a dormant state, are the combined qualities, in the abstract, of two opposite natures, in sex. The combination of qualities makes the individuality in the life that is to be. There never has been, there never will be again, another combination exactly like it. Nature never repeats. Although the parentage of this little seed may be unknown, when the plant is developed, from its characteristics, an expert can quite easily tell to what family it belongs.

The value of a seedling plant over its parents depends upon the desirable combinations of their best qualities. This combination of desirable qualities is very rare, however, and there is not one chance in 400 of a seedling's being better than its parents.

While these seedlings are developing it is very necessary that they be cultivated in a way to strengthen, and thus enhance their valuable qualities. Many valuable seedlings are ruined from the very start by wrong culture. This work should be intrusted to none but experts.

DISCUSSION.

J. W. TRUE: Please name varieties to cover the whole season.

MR. WOOSTER: Some of the best early varieties are: Hawaii, which I have sent out through New England and the West for the growers to test, and they have reported very favorably. The Puerto Rico is another very early variety which ought to be in everyone's collection, and is very early. It has been tested for four years, and is also very satisfactory. It is a very uniform, symmetrical and beautiful berry. It has fine flavor and is excellent in quality. Do not plant on clayey soil, but on high ground, give plenty of room and high cultivation. The Clyde has been badly propagated and is inclined to rot. Give it dry soil and plenty of room, and it will give very good returns. The Glen Mary and Bubach are also good varieties. The Nick Ohmer is a good grower and healthy, but not very productive and so not profitable. The Parker Earle is a very late variety and a good one. The Hunn is extremely late and inclined to rust, but I have carefully selected my plants, set them in new soil, carefully propagated them and got rid of the rust. They give about a picking every other day.

ONE RELATION OF INSECTS TO PLANTS.

A. H. KIRKLAND, M. S., Malden, Mass.

(Abstract.)

The practice of division of labor among human beings is as old as civilization. In fact, in these later days, it is generally considered that the degree of division and specialization of labor is a standard by which the social development of a community may be determined. In the average community each worker performs one or more kinds of labor, contributes one or more kinds of product and consumes a part of the products of other workers. To facilitate these various operations curious tools and elaborate mechanisms have been devised. Here human ingenuity, taxed to the limit, has yielded its most excellent product.

The division of labor among insects and plants dates back to a period whose history has never been written, and whose chronology we can only surmise. A single phase of the interrelations of insects and plants, that of the fertilization of flowers, furnishes a most delightful field for study and one which may be investigated with profit by every lover of the outdoor world. Here we find the mysteries of flower and seed production disclosed; here we learn of the most important service of the honey-maker, and here we see mechanisms and adaptations between plant host and insect guest a thousand times more marvellous and exact than the best product of human brains directing human hands.

Underlying all the interesting phenomena of this entrancing field of research is the great fundamental principle of reproduction of species, the chief end of life. All other activities and stages of development are subsidiary or contributory to the attainment of this grand result. The hidden seed germinates, the roots develop, the leaves unfold, the stalk rises and the plant grows into the form and beauty of its parents. These are natural stages of development, mainly dependent upon ample food supply and proper climatic conditions. Granted suitable soil, proper warmth and adequate water supply, nearly all our culti-

vated plants can go thus far alone. With the approach of maturity, their productive function develops, and buds and blossoms appear. Now the energy of the plant, working independently in this direction, is not sufficient, for the time has reached its limit. It must now seek and receive the assistance of insect visitors, and divide its labors with the members of the winged world before the crowning work of seed production can begin.

And now for a moment let us glance at the structure of a typical flower in order that we may better appreciate the plant's great need of external assistance and the important role of insects in plant economy. We find such a flower made up of four distinct sets of organs, the two outer sets, the sepals and petals, serving to guard and protect the inner essential organs and as guide-boards on which are displayed directions for the insect visitors. The slender stamens bear the pollen with which the flowers are fertilized. The pistil receives the pollen grains and conducts their vivifying contents into the seed-producing region at its base. This is a brief summary of our knowledge of the functions of the flower organs. The essential facts are now commonly understood, even by school children, but by what slow and difficult stages have they been determined! Early students of flowers held that the pollen, as well as the nectar, was in the nature of an excretion, an undesirable product from which the flower must free itself.

In 1682 Nehemias Grew astounded the savants of that day by the announcement of the fact, well substantiated by examples, that the pollen was the means of insuring the fertilization of the flower, and that unless it reached the stigma, no seed could be produced. In the general controversy that followed the announcement of Grew's discovery, much valuable energy was wasted in argument, and not until some fifty years later did the fact became firmly established and generally accepted. The work of Linnæus at this time, covering a large number of investigations, removed all doubt as to the function of pollen. But even the great Linnæus, "father of natural history," though he was, seems to have been in error as to the method by which fertilization took place. He appears to have believed that the stamens grew up over the pistil, and at the right moment discharged their golden load upon the waiting stigma—all of which was ingenious, but not altogether correct.

Late in the 18th century, Christian Conrad Sprengel, a German scientist, given as much to reflection as to observation, found that there were hundreds of cases to which the Linnæan hypothesis would not apply. In many flowers where the stamens and pistils matured at the same time, the two sets of organs were separated by notable intervals of space across which the pollen could not pass unassisted. After long study he announced his startling discovery that flowers are fertilized by insects, that insects in seeking the nectar, brush off the pollen and convey it to the stigma. While this author was thus the first to call attention to the role of insects in fertilizing flowers, yet other students were quick to note its importance and to find that there were many problems in plant fertilization to which Sprengel's explanation could not be satisfactorily applied. In some blossoms the anthers ripened and discharged pollen days before the pistils matured. In others the pistils were fully developed and the stigmas wide open days in advance of the maturity of the anthers. These obvious difficulties were sufficient to prevent the general adoption of Sprengel's ideas, and his work became forgotten in the 70 years that elapsed before the era of Darwin's labors in this field. The master-mind of Charles Darwin at once grasped the contradictory conditions which had seemed to refute Sprengel's theory, and drawing as it were a *bee line* between the flower with mature stamens and the one with mature pistils, he cleared up the mystery and enunciated that great law, "Nature abhors perpetual self-fertilization." Farther than that, he showed that flowers generally were adapted to secure cross-fertilization by aid of insects either through a difference in the time of ripening of the essential organs, or through the development of special structures.

For this work of cross-fertilization, nature has provided the most wondrous mechanisms, many of which we may study and admire with a minimum amount of effort. They may be found in every orchard; they may be studied in every pasture; every woodland exhibits them; and each garden spot numbers them by the score. Their novelty attracts, instructs and delights, and the more they are studied, the greater becomes our admiration and the stronger the spell of their witchery over our senses.

To appeal to the varying fancies of insects, the delights of color, odor or flavor are most lavishly offered. Housewives

know the force of the aphorism, "the way to a man's heart is through his stomach," and the same rule governs the wooing of the flowers. Nectar, the chief ingredient from which honey is made, is the principal offering of the flower to its winged suitors, but this liquid sweetness is usually presented in such a manner as to cause the insect to participate unintentionally in the consummation of the flower's existence.

And here it may be well to emphasize the great value of the honey bee as an agent in cross-fertilizing flowers. Probably no insect seeks nectar with more avidity or greater zeal, and none is more useful to man. Bee-keeping does not receive the attention it deserves among our farmers and gardeners. A hive of bees is just as necessary on the general farm and will yield as good returns in proportion to the investment, as a span of horses or a good milch cow. Herman Müller, who, next to Darwin, has done as much as any single writer to familiarize us with the services of insects in fertilizing flowers, has recorded that of 1,000 insect visitors to flowers there were bees, 413; flies, 305; beetles, 89; butterflies and moths, 69, the remainder being divided among the other order of insects. The importance of bees in this work of cross-fertilization leads me to mention a modern danger to the apiary, viz., the use of arsenical sprays on fruit trees in bloom. Bees in gathering nectar from flowers freshly sprayed become poisoned, and, worse yet, feed the poisonous honey to their young in the brood cells, with fatal results. In many states, laws carrying severe penalties have been enacted to prevent the practice of spraying trees while in blossom. No one except the ignorant or malicious would spray a tree with poisonous insecticides at this time. Spraying is obviously done to prevent insect damage, and I do not recall a single insect whose treatment requires that spraying should be done while the trees are in bloom. Where malice prompts such an action the enforcement of a law on the subject might have a salutary effect; otherwise an educational campaign is all that is needed.

[The adaptations of flowers for securing cross-fertilization were then described in detail. The structure of flowers characteristic of the *Rosaceæ*, *Ericaceæ*, *Labiatæ* and *Orchidaceæ*, was shown by colored charts and the different stages of cross-fertilization illustrated and explained. Turning from meth-

ods and details, some of the practical results of insect agencies in cross-fertilization were then considered.]

These are best seen in cases where a plant is transferred from its native environment to a new one. The early settlers of Australia, finding the soil suitable for the cultivation of clover, soon sent for clover seed and grew a splendid crop—for one year only. Similar experiments elsewhere in that country gave results equally unsatisfactory, and it was not until the bumblebee, the chief agent in fertilizing clover, was introduced that this crop was successfully cultivated.

In southern California there is an extensive area well fitted by climate and soil for the growth of figs. Many successful introductions of fig trees have been made, but in the past it has been impossible to obtain a crop of figs except by the laborious method of securing the cross-fertilization by hand labor. Even then the figs were inferior in size and quality. The peculiar flavor of the fig is due to the seeds it contains. The fewer the seeds, the poorer the flavor. Experts sent abroad by the United States Department of Agriculture, found that the Smyrna fig, the fig of commerce, was fertilized by pollen brought from the wild Capri fig by a small insect which bred in the interior of wild fruit, and emerging, covered with pollen, made its way into the cultivated fruit. The introduction of these living insects while breeding in wild figs was a task surrounded by many difficulties, and to the credit of the entomologist and other agents of the Department, it should be recorded that eventually all these difficulties were successfully overcome. Last summer, for the first time, there were grown in California Smyrna figs, of the best quality, fertilized by the imported Asiatic fig insect. The far-reaching results of this undertaking are difficult to predict, but it is certain by the successful introduction of this little insect, a new industry has been opened to the fruit growers of the far Southwest.

Such cases as these are more interesting because they are unique. Of equal importance are those which we may find in every orchard and garden. Without insect help, our fruit, berry, nut and many of our vegetable crops would be reduced to a minimum, and our finances, our comfort, and our health suffer to a corresponding degree. I am not familiar with the data of the Maine census, but in the little state of Massachusetts we

raise apples to the value of $765,883; pears, $159,416; strawberries, $404,007; cucumbers, $303,699; and cranberries, $1,038,712, a total of $2,671,717 worth of crops whose production is largely dependent on insect aid.

But even the financial side of the question—which is a narrow one at best—leads at once to considerations whose importance cannot be measured in money. Good fruit crops on the cranberry bog, in the garden, or in the orchard mean good food and clothes in the farmer's house, increased comforts in the home, and better educational facilities for the farmer's children. Thus we are led to appreciate not only the interdependence between lower forms of life, but the important relations of these forms to our own existence and welfare. Such studies bring us into closer and more sympathetic associations with the whole living world. A plant or tree is no longer a semi-animate thing; it is a living organism, endowed with needs that must be supplied, and with capabilities for service. The buzzing insect is no longer an aimless, useless creature; it is a vitalized, intelligent being, with conscious and unconscious missions. In caring for its own it becomes at once the servant of the plant and the servant of man.

Such are a few of the teachings of Nature's school. A better knowledge of animal and plant life, of that life other than our own which is all around us, cannot but be broadening to our interests and sympathies. It will enable us to attain to a fuller and better and nobler standard of living. The pages of Nature's book are always open, and in studying her teachings there is great reward.

DISCUSSION.

MR. WOOSTER: Do you think cross-fertilization in strawberries is brought about by bees or by the air; that is, which is the means by which the pistillates are cross-fertilized?

MR. KIRKLAND: In my opinion the strawberry blossoms are dependent on insects for their fertilization. While the air takes up the pollen and carries it about, it is likely to scatter it broadcast and on any other flower as well as the one to be propagated. The bee takes the pollen from the staminate and carries it directly to the pistillate and the fertilization is sure.

MR. WOOSTER: At my home there are acres of strawberry plants all in bloom, with millions of blossoms. There are practically no bees kept in the vicinity, yet the plants thrive and propagate freely. Must it not be the air that does the work? We have almost no bumble bees, and I am at a loss to see how you can make your statement as to bees hold good in this case. Again, I have noticed that plants set on the south side, where the sun shines upon them and the winds are dry and warm, propagate much better than those set on the north side where the cold, damp winds strike them. The fertilization is surely better where the air is dry.

MR. KIRKLAND: It is well known that insects fly about very little in damp weather, but when the air is warm and dry and the sun shines, then the air is full of them. This, I think, will account for the difference in location. I said bees. I do not mean by that word, simply the honey-bee. There are many members of the bee family, the honey-bee, bumble-bee, tiny boring bee, only being a few among many.

MR. WOOSTER: Is not fertilization partly due to the air?

MR. KIRKLAND: Undoubtedly, yet I think I do not say too much if I say that plants are cheifly dependent on insects for their cross-fertilization.

D. P. TRUE: How about apple trees; do they also depend upon the insect for fertilization?

MR. KIRKLAND: Yes. Some years ago during the blossoming season, the weather was very cold and damp, with only brief intervals of dry weather. That year there was almost no apple crop, due, as I believe, to the fact that insects will not fly about in damp weather.

MR. WOOSTER: Does cross-fertilization affect the seed only, or does it also modify or change the flesh, in flavor, for instance?

MR. KIRKLAND: I would refer that question to Prof. Munson.

PROF. MUNSON: I have never seen any change except in form. The question of change in form and flesh by cross-fertilization is, however, one that needs to be handled with gloves; it is not by any means a decided one. Though some experiments would seem to authorize a definite statement, yet we must be careful not to be too positive.

MR. WOOSTER: Mr. Kirkland's talk on the subject of fertilization is especially applicable to the apple, pear and plum trees. Now that he has told us how our friends among the insects help us, perhaps he will tell us how to destroy our enemies in that family.

MR. D. P. TRUE: What is the poison for the gypsy moth which the Commission is using? I have not heard of any one in Maine using it, and I should like to know more about it.

MR. KIRKLAND: It is certainly a pity if it is not used in Maine, for it is very effective. We use four or five tons of the poison every year on the gypsy moth, and get first-class results. We manufacture it ourselves, using sugar of lead and arsenate of soda. Dissolve the sugar of lead in water in a dish, dissolve the arsenate of soda in a separate dish and pour the two together. This gives a white precipitate, lead arsenate; about 11 parts of sugar of lead to 4 of arsenate of soda is the proportion. This lead arsenate is very sticky, and adheres to the leaves like death. This poison is now in the market and can be obtained of Swift & Co., Boston, and of the Bowker Fertilizer Co., of New York. They put it up in paste form in size suitable for the small orchardist. It is best for those who have large orchards to buy the ingredients and prepare the poison themselves. Get your druggist to weigh out your lead and sodium arsenate in packages, parts 11-4, dissolve in separate dishes and mix. This precipitate should be dissolved in water, proportion about one pound of lead arsenate to 10 gallons water, though we have made it one pound to four gallons water and found it did no harm. The cost is about the same as Paris green, but the labor is much less and the results far more satisfactory. The lead arsenate applied in the spring will last until the fall, and kill all insects coming in contact with it. Paris green loses its effect after each rain and in the end does not bring as good results and causes much more labor.

A MEMBER: Will it injure animals?

MR. KIRKLAND: No, not as a rule. Some few instances have been known as where a cow was tethered to an apple tree lately sprayed, and could only feed on the grass directly beneath. The cow was sick, but did not die. I also believe on one occasion, some hens died from an over-dose of lead arsenate, but with a little care there is no fear of harm.

PLUM CULTURE—A DISCUSSION.

R. H. LIBBY: I have been engaged for twelve years in plum culture in a small way, having some seventy-five trees. I have always had a number of varieties so that cross-fertilization might take place, and I think that essential to fruit-bearing. I set my trees about sixteen feet apart, and they have proved very profitable. Do not try to spray the black knot. This is a fungous growth which comes two or three times a year and you must cut it out. It is sometimes well to bathe the knot in turpentine or kerosene, but the best thing to do is to watch carefully, and as soon as you see a knot cut it out and burn it. The orchardist ought to cut down every cherry tree he sees with a black knot on it, for self-protection if nothing else. Clean culture, careful attention, and good cultivation are all necessary to successful plum growing.

C. S. POPE: Do not be discouraged by the black knot. The New York Experiment Station at Cornell University says, that by spraying with Bordeaux mixture you can hold the black knot in check, and I have had very good results with the same method. It forms a coating on the limb and keeps off the spores. Any way, it is a very good plan to spray the plum tree with Bordeaux mixture, and it is also well to add a little Paris green. But if you see a black knot there is just one thing to do, cut it out.

C. S. PHINNEY: I have for the past few years had many plum trees, and I hope to have more. I ordered about six years ago about ten Japanese plum trees from a dealer. He sent me some, saying that they were not very good, and I set them out. Four of these did well. Two years ago I set out about a hundred trees, and to-day I have from one hundred and fifty to one hundred and seventy-five trees, some having fruited twice, and many not at all. I have here some shoots from a Burbank fully budded out, from a tree which bore about $20 worth of plums last year; also a Wixon and an Abundance, fully budded. The Abundance bore a very good crop in 1898, and a fair one in 1899. It is a very good plan if you have an orchard of

young apple trees, to set your plum trees between these and then give good cultivation to both. This can be done at a normal cost and with little labor. I consider the Burbank the best plum for canning, it having a nice flavor and being of good size and texture. The Abundance is the best plum for table use, being of exceedingly fine flavor. I have found in my experience that the New England plum is very much better flavored than the California plum.

A MEMBER: Are your plums as large as the California plums?

MR. PHINNEY: The Abundance can be grown to nearly the size of the California plum if you keep your trees pruned, but if they are allowed to thicken up the fruit is small.

A MEMBER: What kind of soil is best for plum trees?

MR. PHINNEY: I think corn soil is about as good as any. These Japanese varieties bloom early, so must be set on high ground to avoid early frosts. I also raise Hale and Red June. The Hale is inclined to black knot, but by keeping premises clear you ought to avoid that. The Hale and Red June have never fruited, with me.

A MEMBER: Do you raise any of the European varieties, Mr. Phinney?

MR. PHINNEY: No; I raise no European varieties. I find the Japanese good enough for me.

J. W. TRUE: In New Gloucester the Lombard is very well known and used for canning to a great extent. Do you think the Burbank better?

MR. PHINNEY: I think the Burbank just as good as the Lombard for canning, if not better.

C. S. POPE: Do not get carried away with the Japanese. I have found the European full as hardy and just as good producers. The Red June all died out with me, and the Burbank and Abundance are the only hardy ones. If you want quality in your fruit you must cut back your trees one-half or two-thirds, or more. I also think that the Burbank is a good canning fruit. I think the blue damson superior to any of them. It is a great seller on account of its rich color and flavor. The Imperial, Gage, Reine Claude and McLaughlin are also very fine varieties. All stone fruits should be grafted in the early

spring before the frost comes out. Either form of grafting, cleft grafting or splice, can be used with good success.

D. P. TRUE: Twenty-five years ago I started in on plum culture on quite an extensive scale, having about one hundred and fifty trees. From these the best year I ever had I raised only forty bushels. I believe that is because I let the trees get too thick and large and did not prune them as I ought. One day I discovered a black knot, and soon my entire orchard was affected, and I had to cut down every tree I had. I found the Lombard very susceptible to black knot. I also consider the Burbank very good for canning.

R. H. LIBBY: It is an absolute necessity to prune your trees and reduce your fruit. If your trees are too heavily loaded they are sure to die.

PROF. MUNSON: Keep your trees cut back within a reasonable limit, as this is for the best interests of the tree. Produce your fruit near the body of the tree and take the weight from the ends of the limbs, as the wood of the plum tree is brittle and overloading will break it down.

J. W. TRUE: How can you kill the black knot?

PROF. MUNSON: The black knot is a fungous growth. The vegetative part of the fungus is within the knot, eating away the fibre of the tree, the "knot" being simply the fruiting portion. You must cut it out as soon as it appears. Do not let the limb stay, because it is loaded with fruit, but cut it off and save your orchard.

TILLAGE AND PRUNING IN THE ORCHARD.*

Prof. W. M. Munson, Orono.

The subject of tillage is so commonplace that one seldom thinks of it as having had a history, as being the result of a slow process of evolution. Doubtless the principal reason that most persons would give for tillage, if asked for a reason, would be that they are obliged to do it to secure a living. To till the soil would seem to be the simplest and dullest thing in the world. The simple guiding of the plow, or following of the harrow, or it may be "the man with the hoe," is brought to mind. If viewed only as labor, to be most quickly and easily disposed of, this conception of tillage is a natural one: the work must be done because in some way plants thrive best when it is done.

From the earliest times tillage has been a mere necessity, forced upon the husbandman by natural conditions. The first step in its evolution was doubtless the breaking of the earth to get in the seed; the second was the removal of other plants (weeds) which interfered; the third was the stirring of the soil in harvesting certain crops. In course of time men began to realize that there was something in the practice which aids the growth of plants, wholly aside from the lessening of the conflict with weeds. Not until the last century, however, was there any serious attempt to discover the reason for the beneficial effect observed. Jethro Tull, in advocating his horse-hoeing husbandry, while misapprehending the reason for beneficial effect, did a grand work in inducing farmers to till for the sake of tillage.

The immediate effect of tillage is to ameliorate and modify the soil itself. Its secondary and most important effects are directly concerned with the plant. Food materials are set free; the process of nitrification is promoted; the capillarity of the surface soil is lessened, and thereby moisture is conserved.

*The two operations here discussed are among the most important in the management of orchards. Those interested in a fuller discussion of the subject will do well to study Roberts' Fertility of the Land, and Bailey's Principles of Fruit-growing, from both of which I have drawn freely.—W. M. M.

Now the soil is a vast storehouse of plant food, and the first effort of the husbandman should be to make this store available to plants.

In discussing the culture of any class of plants it is important to consider just how the processes of nutrition are carried on, that we may know the reason for the operations performed and the effect likely to be produced by any given operation. A plant derives the greater portion of its food from the soil in the shape of soluble inorganic materials. These materials ascend to the leaves, through the young wood, and then, by the action of sunlight, become changed into organized compounds like starch, sugar, etc. These organized compounds are used in the repair and growth of all parts of the plant, and they are therefore distributed to the leaves, twigs, trunk and roots. The growth of the roots is, therefore, largely determined by the amount and vigor of the leaf-bearing surface, while the latter is also dependent on the ability of the roots to secure the necessary inorganic elements.

For practical purposes the benefits of tillage may be concisely given under three general heads, viz.:

(a) Tillage improves the physical conditions of the soil.

(b) Tillage conserves moisture.

(c) Tillage may augment chemical activities.

The physical condition of soil is nearly always of more importance than mere richness in plant food. Particularly is this the case with such lands as remain hard or lumpy if left to themselves. The chemical composition of a soil is not necessarily a measure of productive capacity, since plant food is of no consequence, unless the plant can make use of it. Every farmer knows that hard and lumpy soil will not grow good crops, no matter how much fertilizer he may apply, and there is no doubt that the number of "worn-out" farms in New England is much smaller than is generally supposed. Any clay soil may be so injured by one season's injudicious treatment as to render it comparatively worthless for several succeeding years. It is useless to apply commercial fertilizers to lands which are not in proper physical condition for the best growth of crops. The average New England hillside contains a sufficient amount of food material, and tillage, by improving the texture of the soil, is the key which is to unlock

this store. More than two hundred years ago, Samuel Hartlib wrote, "Men take him for a fool or a madman that, having store of wealth in his trunk, doth yet complain of want. What though the key be rusty for want of use? 'tis easier to get that scoured than to obtain such another treasure."

By fining the soil and thus increasing the feeding surface of the roots; by increasing the depth and thus giving a greater foraging area; by warming and drying the soil in spring; and by reducing the extremes of temperature and moisture, the physical condition will be rendered best for the unlocking of the treasure.

As already stated, the food materials must be in solution in order to be of use in building up plant tissue. Now the amount of water which falls during the growing season is entirely inadequate to the growth of plants during that time. For this reason it is important that the water holding capacity of the soil be increased as much as possible, and that some means of checking evaporation be adopted. Both of these conditions are best brought about by tillage.

Naturally those soils which are most open and most porous, which contain the largest number of spaces between the particles, will retain the moisture to the best advantage, and will give the best opportunity for the roots of plants to penetrate them and take up the moisture there stored,—in the same way that a sponge will take up a larger amount of water than will a block of wood. By deep plowing and thorough working, and the addition of organic matter, this spongy condition desired is obtained.

The effect of an old board, or a log or a stone wall in encouraging the growth of grass or weeds along the roadside is familiar to all. The reason for this is that the moisture underneath this board, or stone wall, is unable to escape, except as it is pumped out by means of the roots of the plants. The grass in the open field is dwarfed and stunted because of the excessive number of plants crowding one another in the struggle for existence, and the fact that there is nothing to hold the moisture accumulated in the soil. So, in addition to the continual pumping by the plant, there is constant evaporation from the surface of the soil. In order that the best results be obtained, some means must be devised to check this evaporation, and there is

no better way than by breaking the capillary pores near the surface by frequent, shallow cultivation; in other words, by providing a blanket of fine, dry earth. The blanket of fine earth will serve the same purpose in holding the moisture back, as will the board, or stone wall already referred to. Now if we are growing corn, or potatoes, or any other hoed crop, we wish this particular crop to serve as the medium for taking up the food and moisture stored in the soil. The presence of weeds in a given area is pernicious, not so much because of the crowding of the plants that we are growing, although this is a serious drawback, as it is an indication that the blanket of earth referred to is lacking and, consequently, that the moisture which we should conserve is being carried to the surface by capillary attraction and dissipated in the atmosphere.

The value of tillage in aiding chemical processes is recognized by all. By warming the soil and admitting oxygen, the decomposition of organic matter is hastened, plant food is set free, and nitrification is promoted. The simple statement of these facts is, perhaps, sufficient at this time.

Now that we have come to understand why the stirring of the soil makes plants thrive, the feeling of drudgery in tilling the land is lost, and the operation becomes one of the most important and suggestive of all farming operations. We recognize the fact that we must till for tillage's sake; that the purpose of tillage is not simply to kill weeds, but is rather to conserve moisture, pulverize the soil, and destroy the conditions favorable to the presence of insects and other enemies.

In the management of orchard lands it is not so much a question how the tillage shall be performed, as that it be given. Many of our best orchard lands are so situated that ordinary tillage by means of the plow and harrow are utterly impracticable. In such cases the use of hogs is to be highly commended. I am aware, in touching upon this subject, that I am treading upon dangerous ground, but from practical observation, I am convinced that the hog may often be used with excellent results upon orchards which have reached a bearing age. The practice in this case would be to use shoats rather than hogs a year or more old. If six or eight hogs are put in an enclosure of about an acre, if not too highly fed, they will, during the season,

pulverize the soil as completely as could be done with plow and harrow, and will, in addition, serve an important purpose in destroying fruit infested with noxious insects.

PRUNING.

One of the most important characteristics of any plant is the fact that its various parts are unlike; that each branch is, in a measure, independent and capable of becoming a new individual. On this fact rests the philosophy of the pruning of plants.

There is an intense struggle for existence among all organisms, and changes in the numbers and characters of individuals are largely a matter of environment and of readjustment between different types. Each kind is held down to a certain equilibrium in relation to other kinds by the struggle with those kinds and with individuals of the same kind. The greater the number of pigweeds in a given field, the less is the opportunity for another pigweed to gain foothold. The same is true of the strawberry or any other plant of value to man.

Now a tree is essentially a collection or colony of individuals. Every branch is endeavoring to do what every other branch does—i. e., to bear leaves, flowers and fruit. So every branch competes with every other branch, and there are more germs of branches—buds—than can possibly be supported upon any tree. As with individual plants, so with branches—no two are exactly alike, but each is what its position or condition makes it. Some are strong and some are weak. There is no fixed shape or size for any.

Granting this position, we see that there is a struggle among the branches; all are not necessary to the life of the tree; the removal of the useless ones will serve to the improvement of the remaining ones. In other words, pruning is a necessity.

It is commonly asserted that cutting off a large limb is injurious because a given amount of tissue, in the formation of which the plant has expended effort, is thus summarily cut off. In other words, it is assumed that a plant has a fixed vitality from which a certain amount is withdrawn whenever a portion of the plant is cut away. This assumption is wholly gratuitous. The vitality of the plant is very largely determined by the conditions under which it grows—the soil, the surroundings and the treat-

ment. Furthermore, since plants have no nerves, they cannot die of shock, as is sometimes alleged. If the plant is largely what its food supply and other environments make it, then the removal of a portion of it cannot be injurious unless the removal is so great as to interfere with the nutrition of the remaining parts, as already explained.

It is often urged that pruning should be commenced when the tree is planted and continued annually throughout the life of the tree. It may be a question, however, if we really save a proportionate amount of time, or preserve a better growth of the tree, by early pruning; that is, whether equally good or better results may not be obtained by removing superfluous branches at four, five, or six years of age, rather than by pruning very early in the lifetime of the tree. As already suggested, there is an exact balance between the feeding capacity of the plant—that is, its root system and food supply—and the superficial growth. If we have an active, efficient root system, the top will be correspondingly large. If now, a large part of the top is removed, there is an endeavor to restore the balance by an unusually rapid growth. Pruned plants are almost always more vigorous than unpruned ones because the food taken up by the roots is concentrated into a smaller number of branches. Pruning must, in a measure, then, have taken the same effect as manuring, since the stimulating effect of the new growth must be felt upon the root system also.

Let us take a concrete example, recorded by Bailey*: "Two Siberian crab trees were set in the spring of 1890. The trees were as nearly alike as possible and set but 25 feet apart. In 1891, the trees made nearly a uniform growth. During the winter one of the trees was severely pruned, the pruning amounting to 460 inches of wood, of which 432 inches was new wood. The other tree was not pruned. During 1892 the unpruned tree produced 118 new twigs with a total length of 1,758 inches, while the pruned tree produced 120 new twigs and made a total growth of 1,926 inches. The pruned tree, therefore, made 14 feet more growth than the other, which is a large proportion for a tree only three years set; and the growth was stouter upon this tree also. In

* Pruning-Book, p. 15.

other words, a tree from which about forty feet of branches had been cut bore, at the end of a single season, fourteen feet more wood than a similar tree which had not been pruned."

Of all the operations connected with the growing of trees and shrubs, pruning and training, bring the person into closest contact and sympathy with the plant. The true lover of plant life shapes and cares for his plants as thoughtfully and works out his ideals as carefully as he would train and guide a child, and the man who cannot feel this sympathetic contact with his plants is the one who uses an axe in pruning.

It is astonishing, however, to find how little the average orchardist thinks of the actual problems at issue with pruning of his trees. To treat even a few of these problems exhaustively would require much more time than can be given to the subject on this occasion. A few important points suggest themselves for discussion, however. As has already been seen, an important effect of pruning is to increase vigor. Pruning is also practised to produce larger and better fruits and flowers; to keep the plant within manageable limits; to remove superfluous or injurious parts; to facilitate spraying, tillage and harvesting; to train the plant to some desired form.

One of the noticeable effects of severe pruning and the consequent disturbed equilibrium of the plant is the formation of water sprouts. The appearance of the water sprouts seems to be influenced more by the vigor of the plant and the amount of pruning than by the season of the year in which the pruning is done. It is probable, however, that fewer water sprouts will arise if pruning is done after midsummer, since at that time the growth of the season is completed. In any case, water sprouts may be regarded as weeds in the tree top and should be treated as such.

The tendency of plants is to grow from the uppermost buds. By pruning in one way this tendency is augumented, in another it is checked. As a rule, in dealing with fruit trees, the latter end is desired, since the principle that checking growth induces fruit fullness is universally recognized. The heading in of young growths tends to develop lateral and dormant buds or to thicken the top. So that the question of heading resolves itself into a question of personal ideals. To secure a thick topped tree it is necessary.

It has, however, the further very marked advantage of inducing the development of fruit buds near the body of the tree rather than far out on the limbs. This, in the case of plums and tender wooded plants, is an important consideration.

Fruit bearing is determined more by habitual performance and by the condition of the plant than by the kind or extent of pruning. In other words, it is to a certain extent an individual characteristic. Pruning may, however, be made a means of thinning the fruit and thus improving both the size and quality of that which remains, by removing shoots upon which fruit-buds are borne.

But here it is important that the operator knows the manner in which the plant bears its flower-buds. Heading back the annual growth thins peaches, quince, raspberries, blackberries, black currants, and to a certain extent, red and white currants and grapes, all of which develop flower-buds on the wood of the last season. With the apple and pear, of course older limbs must be removed.

Pruning, by thinning the fruit, may have a very important, though indirect effect in controlling the bearing year of many plants. If an individual fruit spur be carefully studied, it will be seen that there is usually an alteration in fruit bearing for the reason that the demands made by the fruit are so great that a fruit-bud cannot develop the same year. So in the bearing year, a leaf-bud develops to continue the spur the following year; and this following or barren year, a fruit-bud is developed for the succeeding year. Alternate years fruit bearing is then largely a question of food supply. If we wish to make a tree bear every year, it is necessary either to supply more food material, or to remove a portion of the fruit.

Since in large fruits one spur bears one fruit, the alternate bearing of individual spurs will continue and it will be necessary to remove all of the fruit from individual spurs, thereby allowing a portion of the spurs to bear one year and others the next. It is doubtful, however, if any amount of thinning can produce an annual bearing habit unless the trees receive other necessary good care. It is probable that the better course to pursue in attempting to get fruit every year, is to change the bearing year of entire plants through a part of the orchard and

allow these to bear one year and others the next year. It is not to be understood that these results will always follow, but the tendency is in the direction indicated.

The season in which pruning is done has some influence on fruit bearing since winter pruning tends to produce wood, while summer pruning does not. The healing of the wound is, however, but slightly affected by the season in which the cut is made. Theoretically, the best time to make the cut, so far as healing is concerned, is in the early part of the season, since the healing process then begins without delay. Other factors, such as the general vigor of the plant, the position of the branch, the length of the stump and the character of the surface, are chiefly concerned in this matter. It may not be out of place, in this connection to refer for a moment to the treatment of large wounds, when it is necessary to make such.

As to the manner of making the cut, the rule laid down by Prof. Sargent is perhaps as clearly stated as possible: "It is necessary to prune in such a manner that no portion of an amputated or dead branch shall be left upon the trunk. The cut should always be made close to and even with the outline of the trunk, without regard to the size of the wound thus made. This is the essential rule in all pruning, and on its observance the success of the operation depends."

Wounds of any considerable size should be given a coating of paint or some other durable substance. A suitable dressing must possess two distinct properties. It must check the weathering of the wound and prevent the growth of bacteria and fungi, and it must be of such a nature as not to injure the surrounding bark. The dressing is of no value in the healing of the wound, except as it prevents decay. For general purposes, a white lead paint is most satisfactory. It is an antiseptic, and it adheres closely to the wood. Wax, shellac, tallow, etc., are lacking in both respects. Bordeaux mixture would be an admirable material for this purpose if it were more durable.

It is often said that all pruning should be done with a pocket knife. In other words that the pruning should be so carefully looked after that the removal of large branches would not be necessary. Theoretically this may be true, but practically such close attention cannot be given, and it is often impossible to tell

which branches should be removed until they have reached considerable size. The most essential pruning tools are a good strong knife, hand shears and a narrow saw. Various modifications of these tools are offered, but simplicity is usually to be desired.

To summarize: Modern ideas and practice of tillage are the product of a gradual process of evolution. The beneficial effects are undeniable, and are manifested in an improved physical condition of the soil. In the conservation of moisture, and in the augmenting of chemical activities, in the management of orchard lands, the fact that tillage is practiced is more important than the method employed.

The philosophy of pruning rests upon the fact that each branch of a plant is, in a measure, independent, and that there is never competition between these members. Pruning is not injurious *per se*, and is often of great benefit, but damage often results from the careless or injudicious use of the knife. Fruit bearing, while to a certain extent an individual characteristic, may be greatly modified by judicious pruning and thinning.

The season at which pruning is performed is of less importance than is the manner of making the cut and the treatment of the wound.

DISCUSSION.

C. S. PHINNEY: In the case of propping up limbs heavily laden with fruit, does the bending of the limb injure the vitality of the tree?

Prof. MUNSON: Yes, the twisting of the wood undoubtedly checks the growth of the tree. There is no doubt that we seriously abuse our orchards by permitting them to bear such loads of fruit. We do not thin the fruit sufficiently. I should say thin the fruit rather than prop the trees.

MR. PHINNEY: Then you think that the propping checks the growth of the tree?

Prof. MUNSON: Yes, the twisting of the limbs will tend to this. I may say that twisting of limbs is a method sometimes employed to throw trees into bearing; it checks the growth. The great object of nature is to perpetuate the kind. If a plant is crowded it always has a tendency to produce seeds, to per-

petuate itself. Girdling the limbs and pruning the roots also tend to check the leaf-buds and increase the fruit-buds.

L. GURNEY: I should like to ask Prof. Munson if he thinks that it is a good idea to make trees bear every year?

Prof. MUNSON: If your trees are of the annual bearing kind you can make them bear every year. By proper feeding and pruning you ought to make any tree bear.

Mr. GURNEY: If you work your tree every day it cannot live as long, can it, any more than a man?

Prof. MUNSON: True, but we can get more out of it while it does live. So in the case of man; we live faster while we do live than did our ancestors, but not so long.

T. M. MERRILL: I should like to ask the professor at what age he would advise setting trees from the bud?

Prof. MUNSON: Two years is about right, I should say.

Mr. MERRILL: Should you wait two or three years before trimming out your young trees after setting?

Prof. MUNSON: I should trim at time of setting.

Mr. MERRILL: Should you trim to a whip?

Prof. MUNSON: Not in the case of apple trees, leave two or three branches, or at least stubs, to increase leaf surface so as to strengthen the root system of the tree.

Mr. MERRILL: I have had the best success in trimming my trees to a whip, cutting off all branches, clipping off the tops wherever I can find three buds, and leaving a good spur to be removed later. I always like to have three buds running out at different angles and to leave a good spur above, so when this withers down it will not kill the buds; the spur should be two or three inches long. This makes a good head and I have had good success with it.

E. W. WOOSTER: What do you think of the necessity of pruning the trees so as to present the most surface to the sun?

Prof. MUNSON: Serious damage has often resulted from this mode of pruning, as it allows too open a head, and trees are injured by sun-scald. It is well to leave small branches in the body of the tree. Do not trim large branches to a whip but leave the twigs to shade the branches.

A MEMBER: In setting trees, is it a good plan to remove all the roots?

Prof. MUNSON: I do not consider this practice best in New England. I think it has not been tried here to any extent. The method has been followed in the South with very good results. We need more surface from which roots shall start out, here in New England, so I favor leaving the young roots.

Mr. MERRILL: Mr. Phinney has had practical experience in reclaiming old orchards and I should like to hear from him.

Mr. PHINNEY: I bought in the spring of 1891 an old orchard of about two hundred trees which were set out about twenty-five years ago. Of these about a hundred and twenty-five were what you might call fair trees, the rest were past redemption. The previous owners of the orchard had never got more than forty barrels of apples a year from them and thought that no more could be got. That spring of 1891, I pruned all the trees, ploughed up the ground, and planted a crop of potatoes, using fertilizer liberally. The next year I sold four hundred dollars' worth of apples from this orchard. I have cultivated the orchard every year, except one; that year I let the grass grow, then turned the sod under. I have used a commercial fertilizer every year and pruned moderately. My fertilizer is made up of about 3% ammonia, 8-10% phosphoric acid, 10-12% potash in the form of muriate. I give to every tree 10 to 20 pounds of fertilizer every other year, depending, of course, on the size of the tree. In 1898 I planted a crop of potatoes in among the trees, not for the potatoes I might get, but to cultivate the trees. In 1899 I did not plough, but cultivated with a spring-tooth harrow, about ten times, I should think. There has never been a year but what I have got a fair crop, this year I believe I got two hundred and seventy-four barrels.

A MEMBER: How did you apply your fertilizer and what is the cost?

Mr. PHINNEY: I sow my fertilizer broadcast. It costs about a cent and four-fifths a pound, or $28 a ton.

A MEMBER: Do you spray your trees?

Mr. PHINNEY: Yes, I have sprayed every year with Bordeaux mixture and Paris green and have had no trouble from insects. I do not believe there is the least need of being troubled by the caterpillar.

Mr. MERRILL: How long did it take you to get your trees into shape by pruning?

Mr. PHINNEY: I cannot say that I feel entirely satisfied with them now. I think it very essential to remove the tops, especially of the Northern Spies. This should be done gradually.

Mr. MERRILL: Did I understand Prof. Munson to say that one should not prune with an axe?

Prof. MUNSON: I do not know that I did say so, but I do say so now. Use a saw, then you are not so likely to do harm to the tree. Make two cuts, one at least a foot from the trunk, then one close to the trunk. This will prevent splitting.

PEAR CULTURE—A DISCUSSION.

D. P. TRUE: Bartlett pears have not been raised successfully here.

L. GURNEY: I raise good Bartletts.

Prof. MUNSON: You must be on high ground.

Mr. GURNEY: How about the Lawrence? I have raised some fine Lawrences and think them a good winter pear.

D. P. TRUE: Some like the Lawrence and in certain localities it does very well. The only two winter pears which I have found any good, however, are the Beurre de Anjou and Vicar of Winkfield. These I have had great success with and know, in my experience, are the best.

C. S. PHINNEY: What kind of soil is best for pear trees, the same as for apple trees, rocky soil, or clayey soil?

D. P. TRUE: I should say the rocky soil would be the best.

J. W. TRUE: Have you had much success with the Flemish Beauty?

D. P. TRUE: I have had a few trees and raised some fine fruit.

J. W. TRUE: Has spraying prevented cracking, in this variety?

D. P. TRUE: I sprayed my Flemish Beauties in the spring and had no cracks. I can't say whether the result was due to spraying or not.

J. W. TRUE: Did the Flemish Beauties russet?

D. P. TRUE: No, they were fair and red-cheeked.

E. W. WOOSTER: Were you ever troubled with pear blight; that is, about June have your trees turn brown, then black, then died altogether?

D. P. TRUE: Yes, and I have found that, as a rule, there is no help for it. If it only attacks a limb, cut off your limb and burn it. However, I have had many beautiful trees blight and I laid it to too much animal manure.

MR. WOOSTER: I sent to Rochester some years ago and got quite a number of pear trees, dwarfs and standards, Clapp's Favorite and Sheldon and six trees of a variety I don't know what. These six trees have borne about ten pears which are striped like a Bartlett. The trees all blossom well but the blossoms fall and they don't bear. The trees are thrifty and apparently hardy, they grow different from any trees I ever saw. The limbs grow in a sort of a curled up shape instead of straight. I should like to know what variety the tree is and the cause of its not bearing.

D. P. TRUE: I can't tell you the variety, but I should advise your using the trees for stock and graft to some other variety.

Mr. WOOSTER: I also have some Clapp's Favorites and Flemish Beauties which I can't do a thing with. They bear fruit about as big as your thumb and hard as a rock. Over in Sullivan, at the same latitude and in the same kind of soil, these varieties do well.

Prof. MUNSON: You must watch and spray. Evidently the pear scab has attacked your trees. You can also prevent blighting and cracking by spraying with the Bordeaux mixture. I call to mind an article I read some little time ago, saying that the Anjou could not be grown in New England. Mr. Libby has shown the fallacy of that statement for he grows very fine trees and says he thinks them the best winter pear.

Mr. GURNEY: I raise the Duchess and think that a pretty good pear.

D. P. TRUE: That is a fall pear, I believe, ripening in the middle of October and will keep till some time in November.

MR. WOOSTER: What shall I graft those trees of mine to?

Mr. GURNEY: Try the Sheldon.

Mr. WOOSTER: The Sheldon won't grow where I live.

D. P. TRUE: I would advise your looking around among your neighbors and finding some variety that has proved a success.

APPENDIX.

MEMBERS OF THE SOCIETY.

NOTE.—Any errors or changes of residence should be promptly reported to the Secretary. Members will also confer a favor by furnishing the Secretary with their full Christian names where initials only are given.

LIFE MEMBERS.

Andrews, A. Emery .....Gardiner
Andrews, Charles E..... ..... Auburn
Arnold, C. A .....Arnold
Atherton, Wm. P .....Hallowell
Atkins, Charles G .....Bucksport
Atwood, Fred..... ..... Winterport
Averill, David C .....Temple
Bailey, W. G .....Freeport
Bennoch, John E .....Orono
Bickford, Lewis I.....Dixmont Centre
Bisbee, George E .....Auburn
Blanchard, Mrs. E. M..... Lewiston
Boardman, Samuel L.....Augusta
Briggs, John ..... Turner
Burr, John .....Freeport
Butler, Alonzo ..... Union
Chandler, Mrs. Lucy A .....Freeport
Chase, Henry M., 103 Federal St., Portland
Chase, Martin V. B ..... Augusta
*Cole, Horatio G..... Boston, Mass
Corbett, Herman .....Farmington
Crafts, Moses ..... Auburn
Crowell, John H .....Farmington
Cummings, Mrs. Anthony .....Auburn
Dana, Woodbury S.....Portland
Dawes, S. H..... .....Harrison
DeRocher, Peter .....Bradentown, Fla
Dirwanger, Joseph A .....Portland
Dunham, W. W.....North Paris
Dyer, Milton . .....Cape Elizabeth
Emerson, Charles L ..... South Turner
Farnsworth, B. B ..... Portland
Frost, Oscar F..... Monmouth
Gardiner, Robert H..... Boston, Mass
George, C. H.....Hebron
Gilbert, Z. A.....North Greene
Goddard, Lewis C .....Woodfords
Grover, Franklin D .... Bean
Gurney, Lemuel.. .... Hebron
Hackett, E. C..... West Gloucester
Hall, Mrs. H. A.....Brewer
Hanscom, John.....Saco
Harris, N. W..... Auburn
Harris, William M.. . ..... Auburn
Harvey, F. L .....Orono
Hobbs, M. Curtis.....West Farmington
Hoxie, James S..... North Fairfield
Hoyt, Mrs. Francis..... Winthrop
Jackson, F. A..... Winthrop
Johnson, Isaac A .....Auburn
Keene, Charles S.....Turner
Knowlton, D. H..... Farmington
Lapham, E. A .....Pittston
Litchfield, J. H .....Auburn
Lombard, Thurston M..... Auburn
Luce, Willis A. .....South Union
McLaughlin, Henry..... Bangor
McManus, John..... Brunswick
Merrill, T. M .....West Gloucester
Mitchell, Frederick H.....Turner
Moody, Charles H. ....Turner
Moore, William G. ..... Monmouth
Moor, F. A..... Waterville
Morton, J. A..... .....Bethel
Page, F. W.. .....Augusta
Parsons, Howard G.....Turner Center
Perley, Chas. I .....Cross Hill
Pope, Charles S .....Manchester
Prince, Edward M ....West Farmington
Pulsifer, D. W.....Poland
Purington, E. F.....West Farmington
Richards, John T... ....Gardiner
Ricker, A. S .....Turner
Roak, George M..... Auburn
Robinson, Henry A ..... Foxcroft
*Rolfe, Samuel.....Portland
Sanborn, Miss G. P.....Augusta
Sawyer, Andrew S. ..... Cape Elizabeth
Sawyer, George B.....Wiscasset
Simmons, H. J. A .....Waldoboro
Skillings, C. W..... North Auburn
Smith, Henry S.....Monmouth

*Deceased.

LIFE MEMBERS—Concluded.

Snow, Mary S.....Bangor
Starrett, L. F.....Warren
Stetson, Henry.....Auburn
*Stanley, Charles.....Winthrop
Stanley, O. E.....Winthrop
Stilphen, Asbury C.....Gardiner
Strout, S. F.....West Falmouth
Taylor, Miss L. L., (Lakeside) Belgrade
Thomas, William W., Jr.....Portland
Thomas, D. S.....North Auburn
Thurston, Edwin.....West Farmington
Tilton, William S.....Boston, Mass
Townsend, Mrs. B. T.....Freeport
True, Davis P.....Leeds Center
True, John W.....New Gloucester
Vickery, James.....Portland
Vickery, John.....Auburn
Wade, Patrick.....Portland
Walker, Charles S.....Peru
Walker, Elmer V.....Oxford
Waterman, Willard H.....East Auburn
Wheeler, Charles E.....Chesterville
Whitney, Edward K.....Harrison
*Woodman, George W.....Portland
Yeaton, Samuel F.....West Farmington

ANNUAL MEMBERS, 1898.

Abbott, L. F.....Lewiston
Beal, Lewis.....Skowhegan
Beal, S. H.....Skowhegan
Benson, Mrs. G. S.....Skowhegan
Burr, Perez.....Freeport
Churchill, E. P.....Hallowell
Cook, Elijah.....Vassalboro
Crowell, Mrs. E. H.....Skowhegan
Dudley, J. W.....Castle Hill
Eaton, Anna A.....Augusta
Jewett, Frank W.....Hallowell
Kyes, Mrs. R. W.....North Jay
Litchfield, L. K.....Winthrop
Macomber, Arthur C.....North Jay
McKeen, B. Walker.....Augusta
Munson, W. M.....Orono
Niles, Silas H.....North Jay
Nowell, F. E.....Fairfield
Paine, Mrs. E. E.....Jay
Shepard, L. G.....Orono
Tarr, Edward.....Castle Hill
Titcomb, B. M.....Farmington
Toothaker, L. P.....Simpson's Corner
Wallis, Belle.....Brewer
Young, Bert L.....Augusta

ANNUAL MEMBERS, 1899.

Abbott, L. F.....Lewiston
Cook, Elijah.....Vassalboro
Cook, Mrs. Sarah F.....Vassalboro
Cook, Miss Eva L.....Vassalboro
Davis, F.....Newport
Deering, Mrs. R. A.....Newport
Eastman, A. A.....Dexter
Folsom, C. A.....Palmyra
Grant, Mrs. Alice.....Newport
Leland, Will E.....East Sangerville
Libbey, R. H.....Newport
Libbey, Mrs. Clara M.....Newport
Marsh, Mrs. J. B.....Newport
Munson, W. M.....Orono
Nowell, F. E.....Fairfield
Phinney, C. S.....Standish
Pope, Mrs. M. E.....Manchester
Sturgis, C. G.....Auburn
Tarr, E.....Mapleton
Twitchell, G. M.....Augusta

* Deceased.

TREASURER'S REPORT.

CHAS. S. POPE, TREASURER, in account with Maine State Pomological Society.

1899.	DR.	
Jan. 2,	To cash from Treasurer 1898	$46 80
	First National Bank, Farmington, interest on stock,	20 00
	Farmington Water Company, interest on stock	8 00
	Merchants' National Bank, Gardiner, interest on stock	6 00
	State stipend	1,000 00
	life membership fees	20 00
	annual membership fees	20 00
		$1,120 80

1899.	CR.	
June 5,	By paid W. M. Munson, expenses, postage, etc	$19 10
	E. Cook, expenses, postage, printing posters, etc	12 43
	J. W. True, expenses, postage, etc	7 05
	Miss G. P. Sanborn, expenses	5 30
	L. F. Abbott, expenses	3 39
Aug. 16.	Lewiston Journal Co., letter heads and envelopes	7 50
	C. S. Pope, expenses, postage, revenue stamps, etc	13 80
	W. M. Munson, expenses	5 50
Nov. 17.	Geo. T. Powell, expenses and services at Newport	37 67
	A. E. Andrews, expenses to Augusta	1 00
	E. Cook, expenses and sundries	13 55
	Maine Farmer Publishing Co., printing premium lists, etc.	18 75
	E. W. Smith, board of officers and speakers at Newport	33 50
	R. H. Libbey, services and expenses	5 00
Dec. 9.	E. W. Wooster, expenses attending Newport meeting	2 40
	Elijah Cook, express bills and expenses at Newport	15 25
	Premiums awarded at Newport	269 50
	Smith & Reid, binding Transactions 1898	7 87
	E. Cook, clerk hire	8 00
	Chas. S. Pope, salary and expenses	34 10
	Augusta Safe Deposit and Trust Co., box rent	5 00
	Augusta Safe Deposit and Trust Co., to credit of permanent fund	20 00
Dec. 30.	Miss G. P. Sanborn	6 00
	W. M. Munson, expenses to Newport and Augusta	17 35
	Elijah Cook, salary	100 00
	John W. True, expenses and express bills	8 15
*Cash in hands of Treasurer		432 79
		$1,120 80

* The greater part of this amount was reserved for the expenses of the winter meeting, January 18 and 19.

PERMANENT FUND.

	Dr.
To stock, First National Bank, Farmington	$400 00
Merchants' National Bank, Gardiner	100 00
Farmington Water Company	100 00
Augusta Safe Deposit and Trust Company	690 00
	$1,290 00
Loss by scale down in stock of Merchants' National Bank, Gardiner	100 00
	$1,390 00
	Cr.
By 137 life members to January 1, 1899	$1,370 00
membership fee of John McManus, Brunswick	10 00
Lewis I. Bickford, Dixmont Centre	10 00
	$1,390 00

FINANCIAL CONDITION OF THE SOCIETY.

Bounty due from the State	$1,000 00
Due from the Maine State Agricultural Society	150 00
Permanent fund	1,290 00
Property owned by the Society	200 00
Interest due (estimated)	40 00
Cash in the treasury	432 79
	$3,112 79

I hereby certify that I have examined the foregoing accounts of the Treasurer of the Maine State Pomological Society for the year 1899 and find them correctly drawn. I also find there is the sum of four hundred thirty-two and 79-100 dollars ($432.79) in the treasury.

Z. A. GILBERT, *Auditor.*

March 9, 1900.

APPENDIX II.

ACT OF INCORPORATION.

STATE OF MAINE.

IN THE YEAR OF OUR LORD ONE THOUSAND EIGHT HUNDRED AND SEVENTY-THREE.

An Act to Incorporate the Maine State Pomological Society.

Be it Enacted by the Senate and House of Representatives in Legislature assembled, as follows:

SECTION 1. Z. A. Gilbert, George W. Woodman, A. L. Simpson, George B. Sawyer, J. C. Weston, Charles Pope, Samuel Rolfe, James A. Varney, Albert Noyes, Rufus Prince, J. C. Madigan, S. F. Perley, Hannibal Belcher, J. B. Phillips, Joseph Taylor, Harvey Counce, John Currier, William Swett, Henry McLaughlin, Calvin Chamberlain, Washington Gilbert, George C. Weston, Hiram Chase, J. C. Talbot and S. L. Goodale, their associates and successors, are hereby constituted a corporation for the promotion of fruit culture, by the name of The Maine State Pomological Society.

SEC. 2. Said society shall have all the rights, privileges and powers conferred by the laws of this State upon county and local agricultural societies, and shall be subject to all liabilities imposed by existing laws upon such societies, so far as the same are applicable to the objects of this society; but the bounty to be paid by the State to said society shall not exceed the sum of five hundred dollars* in one year.

SEC. 3. Said society shall have power to elect such officers, and adopt such by-laws and regulations, not inconsistent with the laws of this State, as may be necessary to carry into effect the objects of the society.

*Increased to One Thousand Dollars by Legislature of 1893.

SEC. 4. The first meeting of said society may be called by A. L. Simpson, J. C. Weston and Geo. B. Sawyer, by a notice signed by them, stating the time and place of said meeting, to be published two weeks successively in the Maine Farmer, the last publication to be seven days at least before the time of said meeting.

SEC. 5. This act shall take effect when approved.

(Approved February 17, 1873.)

BY-LAWS

OF THE

MAINE STATE POMOLOGICAL SOCIETY.

AS AMENDED JANUARY 29, 1874.

ARTICLE I.—Membership.

SECTION 1. Any person may become a member of this Society by signifying his wish to do so and paying to the Treasurer the sum of one dollar.

SEC. 2. Any person may become a life member by paying the Treasurer the sum of ten dollars; and the Treasurer's certificate thereof shall entitle such member, with his wife and minor children, to admission to all the exhibitions of the Society.

SEC. 3. Each member (excepting life members) shall pay to the Treasurer an annual fee of one dollar; and the Treasurer's certificate thereof shall entitle him to admission to all the exhibitions of the Society for that year.

SEC. 4. Any member who shall neglect, for the term of two years, to pay his annual assessment, shall cease to be a member of the Society; and the Treasurer shall erase his name from the list of members. Any member may, at will, withdraw from the Society on giving notice to the Treasurer, and paying the amount due from him to the Society.

SEC. 5. Ten members shall constitute a quorum.

ARTICLE II.—Officers.

SECTION 1. The officers of the Society shall consist of a President, two Vice Presidents, Secretary, Corresponding Secretary, Treasurer, and an Executive Committee, consisting of three members exclusive of the President and Secretary, who shall be members *ex-officio,* and one Trustee for each county in the State; all of whom shall be elected by ballot at the annual meetings, and hold their respective offices during the calendar year for which they shall be elected, and until their successors are elected. In the event of a failure to elect the said officers, or any of them, at such meeting, an election shall be held at the next meeting of the Society duly called and holden.

SEC. 2. All the officers shall perform the customary duties of their respective offices, and such further duties as are herein specified or shall from time to time be imposed upon them.

SEC. 3. The Secretary shall keep a true record of the proceedings of the Society and of the Executive Committee, keep an alphabetical list of the members, and make all reports required or authorized by law.

SEC. 4. The Corresponding Secretary shall conduct the correspondence of the Society. He shall open and maintain correspondence with other Pomological and Horticultural Societies for the purpose of effecting an exchange of publications with the same, for the permanent use of this Society; and shall present at each annual meeting, a report, embracing a review of the proceedings of such Societies, and the substance of all such matters therein as he shall deem to be of special interest to this Society.

SEC. 5. The Treasurer shall keep all moneys of the Society and disburse the same only upon the written orders of the Executive Committee. He shall render his accounts annually to the Executive Committee, and give such bond as said Committee may require. He shall keep a record of the names of the members of the Society, and shall from time to time transmit to the Secretary the names of all new members and of such persons as have ceased to be members.

SEC. 6. The Executive Committee shall have the general management and oversight of the affairs of the Society; transact its business, and appoint all standing and special committees,

when not otherwise provided for; examine the accounts of the Treasurer, and make an annual report to the Society, of their doings and of the financial affairs of the Society.

SEC. 7. The Trustees shall represent the Society and act as its agents in their respective counties. They may receive applications for membership, and forward the same, with the fees therefor, to the Treasurer, and shall promote the interest of the Society in their respective counties.

SEC. 8. Whenever the office of President shall become vacant, the Vice Presidents shall succeed to his office, in the order of seniority, for the remainder of the year; and any vacancy occurring in any other office may be filled by appointment by the Executive Committee; the person so appointed holding the office for the remainder of the year.

ARTICLE III.—Meetings.

SECTION 1. The Annual Meeting of the Society shall be held at the place and during the time of the Annual Autumn State Exhibition, and such notice thereof shall be given as the Executive Committee shall direct. If, from any cause, the regular Annual Meeting shall not be held as above provided, a special meeting shall be held at Augusta in the month of January next following.

SEC. 2. Special meetings may be called at any time by the Executive Committee; of which meetings each member shall be notified, by a notice properly directed and deposited in some post office at least ten days prior to the time of such meeting.

ARTICLE IV.—Funds.

The fees for life membership shall constitute a permanent fund, to be safely invested by the Treasurer under the direction of the Executive Committee, and of which only the interest shall be used for the disbursements of the Society.

ARTICLE V.—Amendments.

These By-Laws, except Sec. 2 of Article 1, may be altered or amended at any annual meeting of the Society, by the concurrence of two-thirds of the members present, *provided, however,* that Article 4 shall not be so amended without notice given and entered on record at the preceding Annual Meeting.

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