

TWENTY-NINTH ANNUAL REPORT
OF THE
FRUIT-GROWERS' ASSOCIATION
OF
ONTARIO.
1897.

(PUBLISHED BY THE ONTARIO DEPARTMENT OF AGRICULTURE, TORONTO.)

PRINTED BY ORDER OF
THE LEGISLATIVE ASSEMBLY OF ONTARIO.



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1898.

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To the Hon

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TWENTY-NINTH ANNUAL REPORT
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1897.

To the Honorable John Dryden, Minister of Agriculture :

SIR,—I have the honor to present the Twenty-ninth Annual Report of the Fruit Growers' Association of Ontario, containing papers and discussions on subjects of vital interest to the fruit-growing community. Among other questions you will note that we have given much consideration to the benefits of spraying, the prevention of the spread of the San Jose scale, the possibility of exporting our tender fruits in cold storage, and other important themes, all of which will be of great interest to the farmers and fruit growers of Ontario.

I have the honor to be, Sir,

Your obedient servant,

L. WOOLVERTON,

Secretary.

GRIMSBY, December, 1897.

FRUIT GROWERS' ASSOCIATION OF ONTARIO.

OFFICERS FOR 1898.

President.—W. E. WELLINGTON, Toronto.

Vice-President.—W. M. ORR, Fruitland.

Secretary-Treasurer and Editor.—L. WOOLVERTON, Grimsby.

DIRECTORS.

Division No. 1	.....	W. A. WHITNEY, Iroquois.
" 2	.....	R. B. WYTE, Ottawa.
" 3	.....	GEORGE NICOL, Cataraqui.
" 4	.....	W. BOULTER, Picton.
" 5	.....	THOMAS BEALL, Lindsay.
" 6	.....	E. C. BEMAN, Newcastle.
" 7	.....	M. PETTIT, Winona.
" 8	.....	A. M. SMITH, St. Catharines.
" 9	.....	J. S. SCARFF, Woodstock.
" 10	.....	J. A. MORTON, Wingham.
" 11	.....	T. H. RACE, Mitchell.
" 12	.....	ALEX. MCNEILL, Windsor.
" 13	G. C. CASTON, Craighurst.

Auditors.—A. H. PETTIT, Grimsby, and GEORGE E. FISHER, Freeman.

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FRUIT GROWERS' ASSOCIATION OF ONTARIO.

ANNUAL MEETING.

• TOWN HALL, WATERLOO. Wednesday, Dec. 15, 1897.

The President, W. E. Wellington, took the chair and called the meeting to order about 10.30, after which the following committees were duly appointed :

Fruit Exhibit : Messrs. M. Pettit, G. E. Fisher and T. H. Race.

Resolutions : Messrs. Thomas Beall, W. M. Orr, Alexander McNeill.

Nominations : Messrs. A. M. Smith and A. H. Pettit (by the President) and Messrs. M. Pettit, W. H. Dempsey and T. H. Race (by the meeting).

New Fruits : Professor H. L. Hutt, the Secretary and the President.

Constitution and by-laws : Messrs. M. Pettit, Thos. Beall, George E. Fisher, Alexander McNeill and T. H. Race.

All these committees were to report at this meeting except the Committee on new fruits.

PRESIDENT'S ANNUAL ADDRESS.

By W. E. WELLINGTON, TORONTO.

It is with a feeling of pleasure, that at this critical period in the history of fruit growing in Canada, I am able to meet the Fruit Growers' Association, with a feeling of hopefulness for the future of this great industry.

For some years past there has been a feeling of great anxiety amongst fruit growers, and with some cause. The difficulties of raising fruit, through the attacks of insects and fungi, were very alarming, but when to this was added the great difficulty of selling the fruit at a profitable rate, in the markets of Canada, it became a subject for very serious contemplation. The cost of raising the fruit was much greater than in the past, and the prices obtained, especially in years when we had full crops, were so much less, that many felt there was little or no money in the industry, and that something must be done, or fruit growing would have to largely be given up in this fertile Province, which is so finely adapted for producing the choicest fruits that are grown.

Thoughtful men, however, have been trying to solve the question, and, it seems to me, with every prospect of success, and I think that many will agree with me, when I say that there is even a greater success in the future than there has been in the past, if fruit growing is carried on in a business-like way, and advantage taken of the new openings which we have found in the markets of England for our surplus fruit.

I believe there is a great market also in the North-West, but, as I suggested last year, on taking my seat as President of this Association, the difficulty to overcome was mainly that of transportation. It will only be a few years, in all probability, before the great North-West is pretty well settled, and there will be a large population who will require our products, and will be dependent upon us for furnishing them fruit, which is such a necessary and beneficial article of diet.

As you all know, experiments have been carried on this season by the Federal Government, aided by leading fruit growers of this Association, in trying to solve the problem of landing our fruit in the English market in perfect condition. I believe that this problem has been pretty well solved, inasmuch as we know the requirements that are necessary to place our fruit in the English market and bring handsome returns.

It resolves itself into this—that only the best fruit must be sent, put up in small packages, carefully and well packed, and that our cold storage system must be so perfected that we can keep the temperature of the fruit, until it is landed in the market, not over thirty-four degrees.

Without going into detail, as our secretary has a full report, and will give you the results of the shipments, I may say this, that where the fruit has been kept properly cool, and put up in proper packages, the returns have been most satisfactory.

This matter is one that should receive the serious consideration of the fruit growers assembled, and I strongly favor committees being appointed to aid the Government in still further carrying out the experiments which have been inaugurated the past season. I am satisfied that success is before us, and that we may with confidence look forward to the future of fruit growing in Canada.

This matter of shipping properly cannot, however, be carried on in an erratic manner. There must be systematic organization, and supervision by competent officials, who will see that packages are properly put up, and that no inferior fruit is slipped into these packages. I am satisfied that one of the great causes of the poor returns which are obtained for fruit, is the fact that there is so much poor fruit thrown upon the market by people who would not take pains to cull the fruit, and who in their anxiety to sell everything they grew, whether first-class or otherwise, have not been careful in putting up their packages in an honest manner. Buying as I do, a large amount of fruit for my own use, in the market in Toronto, and being interested in fruit, examining packages as they are displayed in our fruit stores, I am satisfied that there is room for great improvement in this respect, and that while there are many honest dealers who put good fruit on the market, their honesty is discounted by the many who place inferior fruits and dishonest packages before the public. The suspicion with which people regard the packages, has a tendency to lower the prices, and I thoroughly believe that if we could have legislation in this respect, it would be of the greatest benefit to the fruit growers of this Province.

I leave this matter, however, to the consideration of the society, and I have no doubt it will receive the thought and attention which this subject demands.

Our fruit growers will watch with great interest the result of recent shipments to the West Indies. The enterprise of the shippers is greatly to be commended, and while there will be difficulties that are unexpected to be overcome, and no doubt losses to face in making experimental shipments, it is only by such pluck and enterprise that we can learn the requirements necessary to complete success.

The advantages and necessity of thorough spraying has been fully demonstrated the past season, as set forth in Mr. Orr's report, and it is therefore unnecessary for me to enlarge on the subject. That it pays has been shown; that it must be done if it pays is self-evident.

During the past year a new pest has invaded our country which is more dreaded than all others combined. It has been distributed throughout the Province of Ontario by trees imported from American nurseries, and fruit-growers have every reason to dread this terrible pest, and we must act in an energetic and thorough manner to rid ourselves of it. It cannot be accomplished, however, without aid from our Governments, which we have every reason to believe will be accorded us. The Ontario Government has acted in a very prompt manner, and in a way that I am sure will commend itself to the fruit-growers of the Province, and I believe, as far as it lies in its power, will do everything they can to stamp out this pest.

We must, however, have legislation at Ottawa to prevent the further importation of infected trees, and I would strongly impress upon this Association the necessity of organized action to bring before the Honorable Minister of Agriculture and members of

the Federal Government of America, that the fruit shipments be allowed throughout the year.

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the Federal Government the necessity for prompt action to either prevent the importation of American trees or have them so thoroughly inspected at certain ports of entry (all shipments being confined to these ports) that infected trees cannot further be distributed throughout the Province. All efforts within will be of little avail if the infected trees are allowed to be imported in the future.

Already many States in the Union are taking action, one against the other, and inaugurating laws to stamp out the dread pest, and we, whose interests are so largely bound up in the industry of fruit-growing, must ask our Government to take effective measures to prevent a further spread of the scale.

The Executive of the Ontario Fruit Growers' Association took it upon themselves to call a meeting of the fruit growers to take measures for the destruction of this pest, and Prof. James Fletcher, of Ottawa, and Prof. J. H. Panton, of Guelph, were sent to the meeting, which was held at an orchard in Niagara which was supposed to be infested with the scale. There we found that all reports were true, and discovered that the orchard was seriously affected.

Representations were made to the Department of Agriculture for Ontario, and in response to our request Mr. Orr was appointed Inspector, and he has been busily engaged during the season in locating infected orchards.

Later we found that the pest has been more generally distributed than at first supposed, and in Essex, where so many American trees have been planted, the pest has greater foothold even than in the Niagara district.

I believe that the Hon. Mr. Dryden is at present preparing a bill to come before the Legislature from which we hope much, and it is for the Ontario Fruit Growers' Association to consider what further steps shall be taken to save our orchards.

You will remember that the Executive decided at the beginning of the year to as largely improve our monthly journal as the state of our finances would admit. It was decided to discard the colored plates that had formerly been used and substitute in their stead photogravure illustrations. The result has been that we have been able to use a larger number of illustrations than ever before, and at a much less expense than it would cost for colored plates each issue.

The increased size of the page, and the increase in number of pages, from forty to forty-eight, is worthy of note. In some issues the number of pages has grown to fifty-six, and if the patronage continues to grow, as we have every reason to believe it will, the size of the journal will still further be increased.

The improvement, not only in the cover, but in the matter of the journal, has, I believe, been very generally appreciated. The most flattering notices been received by myself and our secretary through private letters, and the press of the country and also of the United States have in many instances given us very flattering notices, showing that the step which the Executive have taken has earned the appreciation of the public and the results have justified the expenditure.

This is a move in the right direction, and I have hopes that still greater perfection will be reached, and that our journal will take a still higher place amongst the horticultural productions of the Province, in the near future.

I wish also to congratulate the directors and members of this Association upon the fact that we have now reached a greater number of subscribers than ever before in our history. In 1887 the membership was 1,600. We have gradually increased since that date up to the last year, when the paid membership was over 2,500. Now, the number of paid members is about 3,500. Besides this, there are upon our list about 250 unpaid members, not counted in the above number, who will no doubt renew.

True, there was one year in our history when the membership ran up to 2,800, but this was under extraordinary pressure. The premiums given away to obtain this result were pianos, sewing machines, and other articles of considerable value. We have not resorted to any such unhealthy means of securing subscriptions, but our members are people interested in our work, and are likely to continue with us as permanent subscribers,

The premiums offered by the Association have given good satisfaction, are of good value, and of use to people interested in fruit growing. We have endeavored to send out the very best of stock, and something that was new and desirable to test. As a result, we have had no complaints from our large membership, which is well worth noting.

The expenditure during the year, for the distribution of plants, amounted to \$344.08, and the following is the list of plants distributed:—

422 new Japanese Lilacs.
1,100 bulbs (*Speciosum Rubrum*).
1,468 plants, Conrath Raspberry (two plants in each package).
791 Dempsey Pear Trees.

Usually, the premiums to be given the following spring have been decided upon so late in the winter as to serve little purpose in securing new subscribers. Your Executive, therefore, have made up the list of premiums for the coming season at a much earlier date, and we believe the result will be to materially increase our subscription list.

Our list for 1898, decided upon, is as follows: (a) Improved Pæony. (b) Crimson Rambler Rose. (c) Gault Raspberry. (d) New Victoria Black Currant. (e) Wickson Plum.

A circular has been issued containing this list, with description of the different varieties, in order that the work in obtaining subscriptions may go forward in advance for the coming year.

One of the most important features of the work of our Association during the last year or two has been the encouragement of the formation of affiliated horticultural societies. These societies are formed under the Agriculture and Arts Act in incorporated towns and villages, and where they have a membership of fifty or over, receive a grant from the Department of Agriculture. They are allowed to spend their money in securing lecturers on horticultural topics, in distributing floral treasures among their members, and also in distributing horticultural literature. Under the latter head they are able to give each of their members the *Canadian Horticulturist*. Our association undertakes to send a lecturer to each society at some time during the year.

There are now twenty-seven of these societies, and several more are being formed, which are likely to unite with us during the coming year. A great increase in our subscription list may confidently be looked forward to, in this direction.

It is very gratifying to myself and your directors to find, at the end of this year, that we have a surplus in hand. It means, with the large expenditure and improvement in our journal, that it has all been done judiciously, and after careful thought, and without any extravagance. It means that we shall be able to prosecute our work without borrowing as much money from the bank as we have found it necessary to do during the last few years, and it shows an onward movement, as era of prosperity in the history of our Association which means a largely increased benefit to every member.

I believe that the Society in its present prosperous condition is one of the strongest factors for the benefit and good of the fruit grower in the land, and that worked on the lines at present adopted it will still further advance the interests of the fruit grower.

The small grant by the Legislature, I believe, is one of the best, and productive of as great good, as any expenditure which the Legislature may make.

In conclusion, I would urge upon the members of the Association, united action in the development of outside markets, united action working towards the reduction of the cost in transportation; united action to be taken to regulate the packing of fruit, the packages in which it is packed, and the appointing reliable and intelligent agents to sell the fruit, so that the fruit grower may get the full benefit of his labor, and lastly, *imme-*

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FRUIT GROWERS' ASSOCIATION.

diate action to bring before the Federal Government the necessity of drastic measures being put in force, before the spring shipments of infected trees are made, to prevent the further spread of the San José scale.

I have to thank the directors and the members of the Association for the consideration they have shown me, and have no doubt that my successor will receive a continuation of the same.

TREASURER'S REPORT FOR THE YEAR 1896-7.

Secretary Woolverton then read the Treasurer's Report and also the report of the Auditors and Finance Committee thereon, which, upon motion, was adopted.

<i>Receipts.</i>		<i>Expenditures.</i>
Membership fees	\$3,325 17	Amount due Treasurer, December 1, 1896. \$ 41 25
Government grant.....	1,800 00	Canadian Horticulturist
Advertisements	538 71	Salary—Editor, Secretary and Assistant. 1,200 00
Back numbers and samples	48 92	Commissions
Binding and bound volumes	29 95	Premiums.....
		Illustrations
		Affiliated societies.....
		Printing and stationery.....
		Directors' expenses
		Postage and telegrams
		Reporting.....
		Express and duty
		Collection and discount.....
		Auditing.....
		Committees
		Bookbinding
		Advertising.....
		Care of rooms
		Exchanges
		Balance in hand December 1, 1897.....
	\$5,742 75	\$5,742 75

We have examined the books and vouchers of the Secretary-Treasurer and find that they agree and are correct.

GRIMSBY, 9th December, 1897.

A. H. PETTIT, }
G. E. FISHER, } Auditors.

REPORT OF THE FINANCE COMMITTEE.

To the Board of Directors :

We, the undersigned, your Finance Committee, have to report that we have carefully examined all accounts and payments made by our Secretary-Treasurer, and have initialed them to show that we approve of them ; and we believe the expenditures have all been made in the best interests of our Association. We note with satisfaction the large increase in membership and also the increased receipts from advertising, both being larger than in any other year of our history. We also wish to note the careful, neat and systematic manner in which all books and accounts are kept.

(Signed) {
A. M. SMITH,
W. M. ORR,
M. PETTIT.

THE KIEFFER PEAR.

The SECRETARY asked the opinion of the delegates in regard to the Kieffer pear. At Grimsby it is an immense bearer—excels any other variety we have in the orchard. The quality is debatable, but when kept for a little while it yellows up and looks marvellously pretty. A few have been exported to the Old Country. It carries perfectly, and sells equal to any pear that we have shipped. Whether it is desirable to recommend it for cultivation, or whether the growers here think it is worth growing to a large extent, is the question.

Mr. JONES (Catarqui): I had a sample in the Kingston market this fall, grown in the eastern part of the Province, between Napanee and Belleville, and the man who had it on the market reported it was an immense bearer, and it was certainly selling on the market. Although the quality was not what you call first-class, it was not bad, and where tender varieties might be grown I think it would be a valuable pear.

R. L. HUGGARD (Whitby): I have had a good deal of experience with the Kieffer pear. Out of some thirty-four or thirty-five kinds I have had fruiting for some years, the Kieffer has out-balanced all of them as far as finances are concerned. We have never had a blight with it since I started planting it. It is not number one in quality, but for its season it fills the bill, as there is no other pear on the market. I shipped my last barrel of Kieffers only a week ago, and I expect to get \$5 for it. I have been selling them in the fall all along for \$3.50 to \$4.50. Of course we ship them north. I have no hesitation in recommending a planter to set out quite a number of Kieffer pears, inasmuch as they are hardy, early to bear, and immense bearers. I have grown Kieffers since the Philadelphia Exposition.

Mr. ALEX. McNEILL (Windsor): There is no doubt about the quality of the Kieffer pear when it is canned. We have used it for a number of years. I have some growing it, and I am perfectly satisfied with its quality when canned, and also with the quality of it and its salability, and I believe there is something in it. Those growers who are growing for quality simply perhaps had better not plant too many Kieffers to eat out of hand; but when properly canned, and where they are thinned and do not generate that peculiar grain in them that you find in a pear that has been grown on a tree that is overloaded, which is very disagreeable in a canned fruit, the quality is there. If you are in fruit growing for the money that is in it as well as the love of it, the Kieffer pear will yield you excellent returns. Certainly it is one that can be recommended for a commercial fruit grower.

Mr. W. BOULTER (Picton): I would like to ask the speaker if he has any secrets about the canning process?

Mr. McNEILL: None that are not already known to Mr. Boulter, but perhaps for the uninitiated we have a few. My wife does the canning.

Mr. BOULTER: I don't want any misunderstanding. You might possibly draw an inference from Mr. McNeill that anything would do to can that would not do to eat.

Mr. McNEILL: No, I don't mean that.

Mr. BOULTER: Don't run away with the idea that you can put anything up in cans. Any article you put under a hermetically sealed case, if properly put up, will have the flavor when you open the can that it had when it was put in. All the boiling and cooking cannot change the nature of that Kieffer pear or any other article of fruit that you put up; so don't run away with the idea that you are going to improve it by canning. Of course you can make it a little sweeter or a little more tart, or something of that kind. We put up very few of the Kieffers, and my experience is it has not been the very best.

Mr. GEORGE FISHER (Burlington): There are quite a good many Kieffer pears planted in the Burlington district, and those who have them planted always seem to like them, and those who have not them are not quite so sure. I have fifty trees, and while in Montreal last month I made careful enquiries as to the value of the Kieffer pear on that market, and was told that they had always been able to sell them, but generally it was

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necessary to find somebody that never had had any. (Laughter.) That is my idea of the Kieffer pear—you have got to have somebody that has not had them.

Mr. BOULTER: I bought a dozen trees, and I took all the scions off and grafted, and I have not a Kieffer pear left, and I am very thankful. I gave the President an order for a lot of pear trees the other day, and I didn't put one Kieffer in.

Prof. L. R. TAFT (Agricultural College, Michigan): In Michigan we find that the Kieffer does fairly well where we have a warm rich soil in the southern counties. There they get a good size and are comparatively free from this granular nature. As we get north or on the colder soils they do not get to a large size, and as a result the texture is not anything like first-class. We don't regard the flavor as first class, but we think it is a fair pear for canning where well grown. I am surprised to hear of its not blighting in Canada, for with us, although perhaps not exactly one of the worst, it is as bad as the ordinary varieties in blight. I think I have had more complaints from that this year than from any other variety.

Dr. WM. SAUNDERS (Ottawa Experimental Farm): We find the Kieffer in British Columbia does remarkably well. You know at Ottawa we are not able to grow any pears except the hardy Russian sorts, so that our experience is not very much in regard to this particular subject; but there we find the trees bear well and they are healthy, and I think we have had finer crops of fruit as far as the quantity is concerned from Kieffer than from any other variety we grow.

The PRESIDENT: That is the experimental farm at Agassiz?

Dr. SAUNDERS: Yes; the quality is pretty much the same there as it is in the east—it is granular. The quality is decidedly inferior, and while it is said to be a good canning pear, yet I hold the same opinion as my wife—that the best pears are none too good for canning. At the same time, where the Kieffer can be grown to advantage, and other varieties cannot be grown to the same advantage, it may be proper to grow them for that purpose.

Mr. McNEILL: I think there is a misconception here with regard to this canned fruit. I had no idea whatever of hinting that the best were any too good for canning purposes, but I think it is the experience of everyone here that many fruits that are good out of hand are not good to can, and many fruits that are good canned are not good out of hand. It may be true to a certain extent that canning fruit does not change its nature, but it is not altogether true. Even the very best fruit that you get in the cans are not the same as fresh fruit; it never is the same. Take strawberries as an illustration. Nothing is more delicious than fresh strawberries, but who would care for canned strawberries? I never tasted canned strawberries that approached my idea as to what canned strawberries should be. There are different varieties of apples, such as the Minerva, that are scarcely fit to eat out of hand, but when canned it is delicious.

Mr. W. M. ORR (Fruitland): I have grown the Kieffer; I have about 500 trees out, which shows I have some faith in it. I think among pears it is about what the Baldwin and the Ben Davis are among apples. It is a beautiful tree, vigorous grower and abundant bearer. There is a difficulty about its bearing—it overbears—and then the quality of the fruit is not nearly so good as when it is thin and the fruit fully matured. We put the fruit away, and when it becomes fully matured it has a beautiful color and is a very fair eating pear, and for canning purposes reasonably good.

Mr. BOULTER: I can understand why Mr. McNeill has never eaten any good canned strawberries—he lives too close to the United States, where they never put up any in proper shape; but I will take pains to send him up some good canned strawberries. It is simply folly to say that you cannot preserve them, and in the general interests of the fruit-grower canning should not be condemned but rather encouraged, because it creates a market that otherwise would not exist, and uses up surplus stock that would simply be flooding the market. I believe, after the thousands of dollars and the long experience spent in canning, that canners are now able to retain the flavor of the fruits put up.

NEW FRUITS.

The PRESIDENT: I would like to hear what new fruits are valuable; perhaps some new ones have been tested at Ottawa.

Dr. SAUNDERS: I would rather wait awhile. There is a box or two to come from Ottawa with some of the newer varieties of fruit, and especially a good many of the Russian fruits, which do not improve on acquaintance. I don't know whether they are good enough for canning; most of them are not good enough for eating.

Mr. HUGGARD: We have had considerable discussion over the Japan plums through the columns of the *Horticulturist*, and I was very much pleased indeed to read them. My experience with three or four kinds is that they super-eded almost all the varieties that I have planted previously, with the exception perhaps of four or five. They bear abundantly; they are beautiful looking; they are large, which is a great point in the market, and necessary to obtain a large price. I am not speaking of canning, but for selling them by the basket it is necessary to have a well-colored and large plum to get a good price; and I find that Japan plums so far keep up equal with the very best of our common kinds.

Mr. R. B. WHYTE (Ottawa): Have any members of this part of the country tried the Mayberry—the strawberry-raspberry?

Mr. A. E. SHERRINGTON (Walkerton): The strawberry-raspberry is perfectly hardy with me.

Mr. WHYTE: What about fruit—is it any good?

Mr. SHERRINGTON: Plenty of fruit; it fruited right on till frost, and is fruiting still. The fruit was perfect in shape. I noticed in the *Horticulturist* that at Geneva it does not set fruit except a few odd ones, but with me the fruit is perfect in every way. It ripens up, but it has its drawbacks, and great ones at that. It is no use to eat from the hand—it is like a piece of leather; there is no juice, it is dry. We had enough this year to can a jar, and they were delicious canned—(laughter)—very rich; but in my experience it will never be profitable, for the simple reason there is never enough, unless you have a very large plantation, to pick any quantity at a time. They are out in bloom and ripened fruit and green fruit coming on all the time. You cannot get sufficient to make any pickings that would be any good in the market. You might have a bed for home use if they were thought sufficiently worthy for that, but I could not recommend them for planting for marketing purposes. The plant dies down in the fall completely out of sight, and they come up in great trees in the spring. I sent a sample to our Secretary, and a very correct photograph of it appeared in the *Horticulturist*, but of course it does not show the color. It is very fine in appearance. I would not advise anyone to plant it for commercial purposes.

Mr. D. J. MCKINNON (Grimsby): What about plums?

Mr. SHERRINGTON: I have the Abundance. With me the tree is just as hardy as any other. They blossom at the same season as our other varieties. One bore two samples. Fruit matured very fine in appearance, skin thin and tough, and I consider they were a fair quality, of a peculiar flavor which I think most anyone would like. So far they seem perfectly hardy. The first year I planted the lowest thermometer record was thirty degrees below zero, yet they were not the least injured with frost. I have other varieties, but they have not wintered with me; they were only put in last spring. The Wickson has made over three feet of good growth this season; it was planted last spring. Another peculiarity I notice now is their wintering; they grow late in the fall, but this fall those that were out two years cast their foliage just as early as all other kinds, but those that were planted this spring carried their foliage up till late in the spring.

Mr. ORR: How old are the oldest trees you have planted?

Mr. SHERRINGTON: They have been out two years.

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Prof. TAFT: From our experience with the Wickson it is a promising plum especially in the milder section of Michigan. It is the largest plum I have ever fruited, weighing three or four ounces on young grafts, and they bear with us a year after grafting; grafted in the summer they bear a good crop the following season, and gave a shoot a foot in length; cut back to that length we allowed three or four shoots to remain, and there the average was three or four ounces. It is a little better quality than Pond's Seedling—a little more rounded, and to my taste, it is better in quality. Of the other Japan plums I believe there are at least a dozen on the market that are really worthy of cultivation. The Red June, and it seems to me the different variety of Red Nugget—some call it the same, but with us there is a difference of probably ten days in the season—and while I have not tried the Hale I think it will be perfectly hardy. The Burbank is a promising plum where you can grow any kind of plum. The great trouble with this plum is that it blossoms a few days earlier than the hardy varieties, and at the same time is a little more tender in the flower, but fully as hardy where they ripen. I was afraid of the Wickson as far as hardiness was concerned. It is a seedling of the Kelsey, but with us it has proved perfectly hardy, and seems to me one of the best of Japan plums. The Grand Duke has been a very promising plum. We have fruited it now for five years, and that, with the Black Diamond, Monarch and Kingston are all valuable late plums. It seems to me with you and with us in Michigan it is a late plum we need to grow for profit.

The PRESIDENT: Confirming what Prof. Taft has said, I may say concerning the Wickson that we have grown a great many trees and they have stood twelve to fifteen degrees below zero without injuring the top bud, and I think so much of the plum that I have put out an entire orchard of the Wickson—I am so convinced of its great value for commercial purposes. Other Japanese plums we have found are just as hardy as the ordinary varieties. The only cases in which they were injured at all is the first year, where they make sometimes a very heavy growth, and then the top buds would perhaps be killed back; but after that we had no trouble with that at all. They are just as hardy as the ordinary varieties, and the fruit, in abundance, is certainly good. It comes out of the can in excellent shape and has a peculiar flavor that I think is very attractive. The same may be said of Burbank, which probably is an improvement on the Abundance.

A DELEGATE: What about the Satsuma?

The PRESIDENT: I have never fruited that, but in our section it is perfectly hardy; we don't have any trouble with it killing back.

Prof. TAFT: That is a very productive variety with us, and as most of you know it has a very deep red flesh. The juice is red, and when canned, unless thoroughly sweetened, it has to me a pleasant acid flavour, but it would not eat at all from hand. That is the least liable to be killed in the flower. It blossoms ahead of any of the others that I have tried.

Mr. BURRELL (St. Catharines): My own experience has been this year that the Abundance has been of better quality than the Burbank. I don't know whether there is any difference in the season. We thought the Abundance was a more sprightly, pleasant flavor in every way than the Burbank, which seemed heavy and soggy. I would like to ask Prof. Taft if they have experience in picking plums and keeping them to ripen for some time.

Prof. TAFT: I never picked them before the time of ripening. I pick them just when you would call them ripe. They softened and had a sweeter, pleasanter taste than those freshly picked.

The PRESIDENT: You consider them good for shipping?

Prof. TAFT: I think so. We have not raised enough to ship them any distance, but we have received them from quite long distances in good shape.

Mr. HUGGARD: My experience with the Abundance and Burbank is a little different from the expressions here. We picked some as soon as they would be useful, really before they matured—and we used some of those and found them not very agreeable. About a week later on we picked some more that were more ripe, and some more left on

the tree for two weeks longer, that would be four weeks from the time of picking the first ones, and the last were decidedly the best in flavor, and they kept firm right to the end, and they didn't rot on the tree. We hadn't one rotten plum, although they were as thick as they could possibly grow on the branches in knots.

Mr. BURRELL: Those that you picked very early you didn't keep as long?

Mr. HUGGARD: No, we just picked them to taste.

Prof. TAFT: A question was asked about the Ogon. I don't think it is a very valuable plum. It is productive and of fair quality, but only medium sized, and has a very dirty, unattractive color—a dull greenish yellow; and we have the other kinds—Willard and Burbank and others—coming on at the same time, and I don't believe it would be of any great value for market.

The PRESIDENT: Will some one suggest any other fruit?

Prof. TAFT: There was a question asked about this Logan berry and Mayberry, and answered also in regard to the strawberry-raspberry. I want to advise against even testing them if you care anything about the results. To my mind that strawberry-raspberry is a regular pest. It is worse than what we pride ourselves on calling the Canada thistle. (Laughter.) It will sucker and spread. I put out six plants and the next spring they covered a space that was a rod wide and the full length of the rod, and although we had fruit it was of no value whatever. You can put your thumb up inside the berry and have a thimble, and that mass is most all seeds. That is worthless. With us the Logan Berry is of no value. We have a few fruits occasionally. It is somewhat tender, won't stand even zero temperature, and I don't know one of that class of fruits that is of any value even for amateur purposes.

Mr. WHYTE: Have you had any experience with the Wine berry?

Prof. TAFT: I thought that was out of the question entirely. It is rather an attractive plant, and the berry is covered over with a husk that closes over the berry till it is two-thirds grown, but that will not stand without protection anything like zero. It grows to the ground even with us at Lansing, and only by protection do we get any fruit at all. The fruit is acid and of no value.

ELECTION OF OFFICERS.

Mr. RACE read the report of the nominating committee, which was adopted. The list of officers appears on page 2.

EXPERIMENTAL SPRAYING OF FRUIT TREES.

By W. M. ORR, FRUITLAND.

During 1897 the experimental spraying of apple trees, carried on by the Department of Agriculture of the Province of Ontario, was conducted in twenty-nine orchards, situated in twenty-three counties, covering the Province from Sarnia to Lancaster. The original plan was for six sprayings at each point. This would have finished the work early in July. About this time, however, scab was making such headway that it was decided to make another application. Accordingly the men were sent out again and the work was completed by July 18th.

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Only one solution was used—Bordeaux mixture—according to the following formula:

Copper sulphate.....	4 lbs.
Fresh lime.....	4 lbs.
Water.....	40 gallons.

To this, in every case, was added four ounces of Paris Green.

On account of the law, which forbids the spraying of fruit trees while in full bloom, and on account of rain, many applications were omitted, and numbers of applications were discounted or lost by being closely preceded or followed by rain. However, the results were highly satisfactory, in some cases the full 100% of clean fruit being obtained. These trees and their fruit were absolutely perfect.

A great deal of interest was taken in the work and the gentlemen in whose orchards we sprayed, did all in their power to assist us. The attendance during the season reached almost to the 3,000 mark. In one case I know of a man coming forty-three miles to see the work done and obtain information. Thirty thousand sixteen-page bulletins, entitled "Instructions in spraying," containing also a short paragraph on each of the more common insect enemies and fungi, with illustrations, were issued by the department and distributed gratis; many applications were made for these by mail. Numbers of requests were received to have the work done at points we were unable to serve. In one instance a town clerk wrote that he was instructed to inquire upon what terms the spraying could be secured for that locality. The people are gradually waking to the fact that spraying is indispensable to the up-to-date orchardist, and every year the experimental, or more properly now, the instructional spraying of fruit trees is attracting more and more attention. The attendance this year was 60% greater than last year, and inquiry by mail was ten times as great.

In a recent report by the entomologist of the State of New York, three hundred and fifty-six species of insects which commit depredations on the apple are catalogued, and each is known at times to feed upon the apple from choice. Many others will feed upon it when other plant food is lacking, and he adds: "The least harmful among them may at any time, through such sudden and inexplicable multiplication as is often witnessed in the insect world, become a serious pest." Add to these the injurious fungi, and you will have some idea of the phalanx of enemies the apple grower has to face. I believe the most effective artillery we have is the spray pump, but to be effective the proper ammunition must be used at the right moment. With every insect there is a time when it is most vulnerable with same treatment, which can only be successfully applied for a few days in the season. For this reason some have objected to the loss of the time during which the trees are in bloom, claiming that to be handicapped at that season is unjust. Professor Lintner has prepared a list of seventeen common insects which feed upon the apple while in bloom, for which arsenites are the proper treatment; and our agents who did the spraying found the following insects at work while the blossoms prevented spraying: Curculio, bud-worms, leaf crumples, cankerworm, tent-caterpillars, leaf-roller, eye-spotted bud-moth, and case-bearer. However, we found no difficulty arising from the regulations, and were able to observe the law to the letter and successfully deal with these insects by spraying before and after blooming.

In the report of a series of careful experiments, covering several years and published last year, Professor Webster, of Wooster, Ohio, demonstrates conclusively that spraying with Paris Green while tree are in bloom is fatal to bees. He has found arsenic in the abdomens of the dead bees and in the larvæ of a colony which died suddenly without apparent cause. The interests of the horticulturist and the apiarist are allied, and it would be a mistake to destroy bees as they perform so important a part in the fertilization of our fruits.

I want to give you a few of the actual results obtained in our work this year. In calculating the percentage of perfect fruit the following plan was adopted. A part of

the tree was stripped of every apple. These were carefully examined and any specimen which had a worm or a spot, no matter how small, was rejected.

IN MR. WARNER'S ORCHARD AT TRENTON.

	Experimental spraying.	Unsprayed.
Spy.....	76 per cent. clean.	8 per cent. clean.
Snow.....	75 " "	No clean fruit.
Wealthy.....	90 " "	20 per cent. clean.
Summer P'ermain.....	75 " "	5 " "
Baldwin.....	90 " "	10 " "
Bottle Greening.....	76 " "	5 " "

The packers said it was the best fruit they had packed this year, and Mr. Warner says the increased value of the crop on the twenty-five sprayed trees was \$100.00.

In George Adams' orchard, Smithville, Swaar experimental spraying 80% clean and held its fruit. Swaar unsprayed, dropped 75% of its crop and not a clean specimen. Roxbury Russet, experimental spraying, 90% clean and held its crop. Roxbury Russet, unsprayed, dropped most of its crop and what remains is worthless. Canada Red, experimental spraying, 90% clean. Canada Red, unsprayed, worthless. Snows, experimental spraying, 80% clean. Newton's Pippin, experimental spraying, 90% clean. Spy, experimental spraying, 90 p. c. clean, and well loaded. Spy, unsprayed, well loaded but under size and not a clean specimen to be found. There are ninety trees in this orchard; we sprayed twelve. Apart from these, Mr. Adams says he did not have more than two barrels of clean fruit.

Mr. Bradt, of Port Rowan, who spent several weeks buying apples between Port Rowan and Smithville, says he has not found an unsprayed orchard that will give more than 7% of clean fruit, with the exception of one which he thinks will give 15%. He says there is five times as much clean fruit on the twenty sprayed trees in Mr. Adams' orchard at Smithville, as there is in any other entire orchard he has seen. He reports a fair crop in many orchards, and spoke of one in which there will be three hundred barrels, but said there would not be more than ten barrels of clean fruit and not more than seventy barrels that will be worth packing. The fruit on some orchards is so badly scabbed that Mr. Bradt says he will not handle any of it.

IN MR. J. P. THORN'S ORCHARD, PICTON.

	Experimental spraying.	Unsprayed.
Spy.....	90 per cent. clean.	10 per cent. clean.
Colvert.....	90 " "	
St. Lawrence.....	75 " "	10 " "
Snow.....	75 " "	25 " "
Golden Russet.....	90 " "	25 " "
Bellefleur.....	75 " "	10 " "
Swaar.....	75 " "	10 " "
Red Astréchan.....	80 " "	15 " "

Mr. Thorn says that the spraying of the twenty-nine trees we worked on was worth \$75.00 to him. He further says that while unsprayed Spys were worth \$2.00 per barrel he was getting \$3 50 per barrel for sprayed fruit.

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IN J. J. MOFFAT'S ORCHARD, WINGHAM.

Blenheim Pippin, experimental spraying.....	95	per cent. clean.
Greening experimental spraying.....	95	" " and good crop.
" unsprayed	30	" " clean.
Crop light, most of fruit having dropped.		
Spy, experimental spraying.....	80	" " "
" unsprayed, well loaded with undersized fruit and not a single clean specimen to be found.		
Duchess experimental spraying.....	100	" " "
" unsprayed.....	50	" " "
Maiden's Blush, experimental spraying.....	95	" " "
" unsprayed	50	" " "
Tallman's Sweet, experimental spraying.....	95	" " "
" unsprayed	2	" " "
Snow, experimental spraying	100	" " "
" unsprayed	5	" " "
Trees loaded, but fruit almost worthless.		
Colvert, experimental spraying	90	" " "
" unsprayed	40	" " "

IN MR. CAMERON'S ORCHARD, SOUTH LANCASTER.

St. Lawrence, experimental spraying	90	per cent. clean.
" unsprayed	10	" " "
Maiden's Blush, experimental spraying	100	" " "
" unsprayed		no clean fruit.
Snow, experimental spraying	100	per cent. clean.
" unsprayed		no clean fruit.
Alexander, experimental spraying	100	per cent. clean.
" unsprayed	10	" " "
Baxter, experimental spraying.....	90	" " "
" unsprayed	10	" " "
Hash, experimental spraying	100	" " "
" unsprayed	20	" " "

Sprayed Maiden's Blush sold at \$4 per barrel; Unsprayed Maiden's Blush at seventy-five cents per barrel. This orchard is just on the bank of the St. Lawrence and is remarkably free from insect enemies.

Many other instances might be cited, but the above are sufficient to show how effective spraying is when properly done. It also shows what an enormous loss is annually sustained by the fruit growers of Ontario, through neglect of their orchards. Spraying not only increases the percentage of clean fruit, but the specimens are larger, brighter, better flavoured, and possess superior keeping qualities. Because the foliage is protected from injury by insects and fungi, and, being healthy, performs its important function properly.

One gentleman, in whose orchard we sprayed this year with splendid success, said that he had sprayed for four years with very unsatisfactory results. The trouble was that instead of breaking up the spray, as should be done, until it looks like a vapor and settles on every part of the tree and fruit like a fog, he had used a coarse spray with which it is impossible to touch every part. In this way the scab had an excellent chance to thrive, and much of the foliage was not poisonous to insects feeding upon it. When a coarse spray is used the work is only half done, and there is a great waste of material, for every drop which falls to the ground is lost.

When the nozzle is working properly, and the sun is shining, you will often notice a miniature rain-bow on the spray. Do not drench the trees but spray them. As to the cost of spraying we find that in an average apple orchard about two cents per tree per application covers the cost of material and labor.

With apples at from \$2.50 to \$4.00 per barrel at home and from \$6.00 to \$7.00 in Britain, many an orchardist to-day is regretting that he did not spray.

Dr. FLETCHER, (Central Experimental Farm, Ottawa): The report is an exceedingly valuable one as giving definite results. The only trouble is, I am afraid the fruit growers will listen and say, "What a nice report!" and do nothing. That has been the

work of the last fifteen years, since spraying was introduced. I should like to draw attention to one or two points in the report. One was the list of insects which Prof. Lintner, gave as insects which attack fruit trees at the time they are in blossom. I don't think it was a particularly wise thing for Prof. Lintner to have ever published that list, because there is no insect that need be treated at that time. It is an injurious practice that there is no good in, and on the other hand a great deal of harm. I don't know of any insect that the trees need be sprayed while in bloom to destroy. There is no necessity for spraying fruit trees while they are in bloom, and it is better not to do it, because there are better times. Another point was with regard to the general principle of spraying. Why is not spraying adopted all through Canada to-day? There is nothing new about that report. Those figures can be found for years from good men, and now you have got it in your own report; you have it printed; but I know from experience you are not going to adopt it; you are not going to do your spraying. Some of you may—the more progressive men—but the fruit growers of Canada will not spray; and one of the reasons I find they will not spray is that the buyers of fruit say they will not buy fruit that has been sprayed. Only last week a man in my orchard said, "I dare not spray, or people will say, 'You spray your fruit,' then my people won't buy." This is founded on ignorance. There is no man yet, able to get arsenic or arsenical mixtures on the fruit without destroying the bushes. If the life can absorb arsenic, it in itself is destroyed. Long before the fruit can be rendered poisonous it is rendered unsuitable and unmarketable; therefore the contention that there is any danger in spraying fruits is foolish, and has been shown so over and over again. Why people don't spray is simply because it involves a little trouble and a little more expense, and we are loath to take trouble if it is not necessary to do it. Every man who has sprayed systematically and properly has always reaped those percentages Mr. Orr has shown us. I hope the fruit growers will adopt that method of spraying. Over and over again a few orchards have been picked and treated, and on the other side of the road orchards have been left alone, and every time the beneficial results have been attained. About ninety per cent. of the spraying is not spraying at all. You take a man and duck him under water, and that is not spraying. That is about the meaning of the word spraying by ninety per cent. of the people, with cheap spraying pumps and cheap nozzles. You turn a fire hose on a tree, and that is not spraying. I think this is a most valuable report, and if the gentlemen will follow it out they will get the results mentioned in this report. How is it that entomologists for the last fifteen years have always got those results, and men who are practical fruit growers do not get them? Simply because entomologists take care to do it properly, because that was their chief business, while to the fruit grower it was secondary. That spraying is just as important as any other operation that you put in practice on your farms, and I think the gradual acceptance of that is getting wider-spread through the country, and the only difficulty that seems to me to arise is, that buyers are supposing that if it is known the trees are sprayed, there is still that old idea that the fruit can be poisoned. Well, you can challenge it and get a chemist to prove it for you, or you can even prove it with a microscope, because the particles of Paris Green are so large that they are easily detected by a microscope on the outside, and if the arsenic is dissolved you can detect it by the injury to the bushes. I say there is no danger at all. I have examined the matter very carefully so as to be able to protect myself in making statements as positively as I do now.

Mr. McNEILL: It is over ten years since I bought my first spraying pump. After listening to the various speakers wondering why the fruit growers did not spray more, I came to the conclusion that one of the great causes was the imperfect machines that we have been using. I first used an old-fashioned pump that cost me \$10, but it was the dearest \$10, in one sense of the word, that I ever invested, because I would work with it a while and then go and hunt for the hired man to help; and the hired man would play out in two or three hours and want a new job. The second season it would hardly do anything; the third season, I think, we threw it in the fence corner. For two or three years I did not spray at all. Since I have bought a modern pump the difficulty of spraying is nothing. My neighbors who do not own a pump but who rely on me for the use

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of mine are doing spraying that they never would have done if I had that old pump. Spraying with an modern pump is just as simple an operation as watering a lawn. Get people to use a good tool and they will spray every time, and they will never go back on it. An essential point is to get a good pump and a good nozzle.

Mr. MCKINNON: I would like to hear the views of some members as to spraying in winter, when there is perhaps a little more time than in summer. I would also like to know if anyone has had experience of working the spraying pump by gas machine or small steam engine. I am told that on the other side these are somewhat extensively used and do the work very satisfactorily.

Mr. HUGGARD: I have had a little experience of spraying in winter. Two years ago we sprayed some snow apple trees in November or December, and on those trees that were not sprayed in winter we had considerable more No. 2, or spotted, apples than on those that were sprayed. This year I am trying it more extensively and with several varieties. About two weeks ago we spent an hour or so spraying certain trees which we have marked so as to test their results for next season. I am satisfied the trees should be sprayed before the buds come out, and if they are sprayed twice so much the better. Another feature in spraying is that it is quicker to apply. Lye made out of wood ashes applied at that time will do more good than two sprayings after the buds are out. The leaves come out very vigorously, and the blossoms, and so on. This spring it is very noticeable. One row the entire length of the orchard we sprayed with the lye and the other not, and it was noticeable the entire season. The branches are smoother and there seem to be less lice and bark insects than when we sprayed later on, so that an early application, to my mind, is the thing; and from my experience I am satisfied an application late in the fall, after the leaves have dropped, is just as good as in the spring.

Mr. BURRELL: How strong a solution of lye?

Mr. HUGGARD: We get a forty gallon barrel about half full, or with about two bushels of ashes, and fill it up with water and leave it there two or three days and it becomes quite gritty between your fingers, like rubbing a piece of glass, and if I find it is not so I add a little lime when using it so as to strengthen it up. I think, however, lime is a little too heating on the surface and has a tendency to make the young bark crack, which I do not like to see. We like our trees as smooth as we can get them, and the more ashes I have used on trees in that way, the smoother the trees are and the freer from insects.

Mr. MCKINNON: Would concentrated potash be better than lye?

Mr. HUGGARD: I presume it would be equally as good, but I can get ashes cheaper.

Mr. MCKINNON: It would be less liable to clog the nozzle.

Mr. TWEEDLE (Stony Creek): I have noticed that the apple scab only propagates in continuous wet weather, and we need only to spray at such times for that purpose. I noticed that this year we had considerable rain four or five days running just along before the apple blossoms opened, as the peach bloom commenced to open, sometime in May, and by spraying a couple of times then we seemed to control it quite well until the wet weather that struck us in the latter part of haying, in wheat harvest. I think that rain was pretty general; then we got considerable more scab, and I believe had we followed up with another application of Bordeaux mixture at that time, we might have controlled the scab on the apple crop pretty thoroughly. The pumps we have nowadays work so easily that there is no need for any more application of machinery to drive them. The best pumps now made can be handled by a boy twelve or fourteen years of age and work all day, or by a man with one hand without tiring. I have handled it myself and followed the pumps all day and not been tired.

Mr. ORR: I was just going to ask Mr. Tweedle to read this report. We have been doing a little experimenting this winter, and I think it would be interesting for the gentlemen to hear it.

Mr. TWEEDLE then read report of spraying experiments with a view to ascertain the effects of cold rains at the time of blooming.

REPORT ON SPRAYING WITH ICE WATER WHILE IN BLOOM.

Following is a report of experiments in spraying fruit trees with ice water while in bloom, to ascertain the effect of cold rains on the fertilization of blossoms and the setting of fruit; also to ascertain if heavy bloom could be partly sterilized in this way, thus saving the labor of thinning fruit:

The work was done by Jos. Tweedle at Fruitland, Ontario, and was in connection with the experimental spraying of fruit trees carried on by the Department of Agriculture for Ontario.

Three trees of Langhurst peaches, three trees of Shipper's Pride plums; three trees of Kieffer pears, and one side of an Astrachan apple tree were selected for the work. The peach, plum and pear were in full bloom at the time of commencing work, and the apple bloom was just opening.

For spraying, a barrel of water was cooled to the lowest temperature possible with broken ice. The tripple nozzle was used. One tree each of the peach, plum and pear was drenched for seven minutes; one each for three and one-half minutes, and one of each had one side drenched for seven minutes, the other half remaining unsprayed.

One side of the apple tree was drenched for seven minutes.

This work was performed on May 13th, 14th and 15th on all the trees, and on the 17th and 18 on all except the peach, from which the bloom was falling.

On the 18th the plum and pear bloom began to drop. The weather was fine and warm, excepting a shower on the afternoon of the 15th. Results were carefully watched, and no difference could be noticed in the crop set on sprayed and unsprayed trees of the same variety, nearly 100 per cent. of the blossoms setting in each case.

It would appear from the results of the above experiment that a cold rain during the blooming period does not injure the blossom unless so prolonged as to interfere with the fertilization of the blossoms.

Dr. FLETCHER: The question was asked whether there was any advantage in spraying in winter. It is just as well to discuss why we spray at any time. Spraying will not destroy everything and kill every fungous disease. The question whether it is advisable to spray in the winter must be answered decidedly "yes." Why do we spray in winter? We spray to kill, chiefly, the fungous diseases—the black spot of the apple; and it is wise to do that because that fungus passes its life largely on the trees in the winter time, and you must not spray with Paris green or kerosene emulsion; you must spray with a fungicide, and the cheapest and best at that time of year is sulphate of copper, one pound to five gallons of water, and if you spray with that solution you will destroy all the fungus you reach with it. It passes the winter on the fallen leaves, so you must spray again in the summer. Then there will be a large quantity of spores left on the fallen fruits and leaves, from which infection will come again; therefore it is necessary to spray during the summer again, but it certainly is wise to spray in the winter. That may be done at any time after the leaves have fallen or before the spring opens, and perhaps the best time is as near as possible to the time when the vitality of the whole tree revives, because the fungus is then more susceptible to injury probably than in the autumn; but if it is more convenient to spray in the autumn, from time or any other reason, certainly spray in the autumn, but you can spray during the winter with any spray to destroy fungicide diseases. You must decide what insect you want to fight against, and you cannot make one application that will destroy everything. That is one of the mistakes that is made. Paris green does not by any means destroy everything, although that is the general conception of it throughout the country. It is only by bringing it up in meetings like this, time and time again, that men gradually learn. Men are interested in it to-day that thought nothing of it two years ago. Certainly in regard to fungus and black spot it does pay to spray in the winter time.

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Mr. MCKINNON: How would it be to gather the leaves that fall and burn them?

Dr. FLETCHER: If your orchard were very much sheltered it might be important to burn the leaves, but I think in general practice it would be impracticable. You might destroy a great many spores undoubtedly.

Mr. T. H. RACE (Mitchell): Would Dr. Fletcher recommend spraying in winter for gooseberry mildew?

Dr. FLETCHER: I have had no experience; I think the usual practice is to spray during the summer.

Mr. RACE: I am strongly convinced that Bordeaux mixture has no virtue at all with gooseberry mildew. I think I have given it a thorough test the last two years, and my experience is it is absolutely harmless so far as mildew on the gooseberry is concerned.

Mr. MCKINNON: What is the best thing for grape mildew? Is Bordeaux mixture good for that?

Dr. FLETCHER: Yes, undoubtedly it is the best remedy.

Mr. ORR: Is not sulphur thoroughly effectual for that?

Dr. FLETCHER: No, not thoroughly.

Mr. ORR: We have found no difficulty whatever with it in the last ten or twelve years. We have found sulphur controlled it thoroughly.

Dr. FLETCHER: There are two mildews to the grape.

Mr. RACE: Would Dr. Fletcher or Dr. Saunders let us know whether either ever tried Bordeaux mixture on gooseberries that had been mildewed before? There are a great many things that are recommended for gooseberry mildew that have been tried on gardens and gooseberry orchards that never had mildew; but in an orchard or garden where the mildew has been in one year, has any man found that the Bordeaux mixture has prevented it the following year? I used to hold to the theory that a sufficient application of hardwood ashes beneath the bushes, and thinning the bushes so as to let in plenty of sunlight and air, was all that was needed to prevent mildew. I stuck to that theory for several years, but I found that mildew got into my garden by getting bushes from other quarters that had mildew, and after it once got in there all the hardwood ashes that I could pour into the garden had not the slightest effect, so I had to resort to spraying, and I have been trying spraying with Bordeaux mixture for two years. I know I have done it as thoroughly as can be done, and it has not had any effect at all on the mildew.

Dr. FLETCHER: When did you begin to spray?

Mr. RACE: I began just as the buds were forming and gave the first spray. Then after the blossom was just about open—before it had opened—I gave the second spraying. After the blossom had dropped and the berry was fairly formed I gave the third spraying. Then I didn't do anything further than that, because I found in a very few days after I had finished the third spraying the mildew appeared.

Dr. SAUNDERS: I don't know that I can fully answer Mr. Race's question, but I can say this much, that there was mildew among those gooseberries on those experiments with the Bordeaux mixture that were tried by the Horticulturist at Ottawa. I was not present at every trial, but I saw enough to prove that it had a marked effect in lessening or preventing the mildew on the English gooseberries, which, with us, are very liable to mildew, and some of them were badly withered and worthless. Others again are much less liable to mildew. It is a subject that will bear a great deal of further experimentation. Mr. Race's experience will certainly be a stimulus to others to try still more perseveringly to see whether the mildew cannot be controlled entirely by that means. I don't mean to say that we have been without mildew, but the opinion of the Horticulturist was that the spraying with the Bordeaux mixture had been decidedly beneficial for that purpose.

Mr. RACE: I was so determined to give the Bordeaux mixture a thorough test this year that in the third application I took an open dish with the mixture in and bent the

bushes down into it and held it there so that every berry that was then formed was thoroughly covered, and I noticed berries afterwards with a coating of the mixture on the outside, and actually the mildew developed right there almost underneath that coating, so I was satisfied then that there was something very wrong with either myself or the mixture, because it didn't have any effect.

Mr. BURRELL: I don't think Mr. Race's experience is exceptional, because Mr. Morton, of Wingham, told me last winter that he had given it a very thorough trial on gooseberries with the same negative results that Mr. Race found, and another very careful experimenter, Mr. Pafford, of Niagara, had found it not so successful. In my experience I cannot say I have found Bordeaux mixture absolutely successful for mildew on the gooseberry.

Mr. A. H. PETTIT: Does Dr. Fletcher class the black rot as mildew? The sulphur remedy spoken of by Mr. Orr we find very well in regard to one kind of mildew, but there is another kind of mildew that Grimsby has not been attacked with at all.

Prof. FLETCHER: To state the matter shortly, there are two mildews of the grape—the downy mildew and the powder mildew. These two names are so close alike that they are somewhat confusing. The powdery mildew, which is prevalent in the Niagara district, is the one which is treated with sulphur with considerable success. The downy mildew, however, is a much more serious disease, and one which is not prevalent in the grape-growing district of Niagara, but is very prevalent in some other parts of Canada. For the powdery mildew the sulphur is the remedy, and can be used in a paying manner, but for the other it is no use at all, and you must use the Bordeaux mixture, and that is the only remedy that I believe can be used effectively. It is the most serious disease that is at Ottawa, and it is not an unusual thing to see a grape vine drop the whole of its crop after spraying. These matters have been treated at great length in the reports of the Society, and it is unwise for anybody to take a verbal statement such as this is. There are endless printed accounts of these different diseases. We have them in the *Horticulturist* and in agricultural reports; you can get these from Guelph and Ottawa, and it is wise to get these printed reports and follow them—not make them as most women make a pudding, have the recipe before them and never follow them. Most people think that, when spraying, if a pound of an ingredient is good two pounds would be better; but get those rules and follow them accurately and you will get results. I am surprised at Mr. Race taking all the trouble he did with the Bordeaux mixture, and not using first of all the sulphate of copper spray, which is very much more effective. Of course I don't say any of these remedies are going to be perfectly effective every time; in fact I will tell you before you begin that they are will not, but the spraying experiments conducted from year to year show it is a paying operation, and a man who says he has not time to try them is the man who says he has not time to make money, and if a man has not time to save 75 per cent. of his fruit crop he has not time to save 75 per cent. of every dollar he makes.

Mr. MCKINNON: I have had no mildew on any of my grape vines since five years ago till this year. This year I sprayed more faithfully than ever before, and nearly all the Rogers vines were affected, and some of them seriously affected, with mildew. I found that especially the case where they grew most rankly on the richest soil. The Niagara were slightly affected, but a great many Rogers vines were absolutely worthless, although they were faithfully sprayed, even more carefully than in former years.

The PRESIDENT asked Dr. Taft to give his views.

Dr. TAFT. We have been doing a good deal of spraying on all these lines, and as the gooseberry was mentioned I would say that I have gone a little further than anyone yet, from the fact that I used three different materials for spraying. The first is this copper of sulphate solution that Dr. Fletcher advises, applied in the spring before growth starts. Then both against mildew and currant worm I used Bordeaux mixture with Paris green about the time the leaves are half open. Before they blossom, and as soon as the fruit is set, I spray again with Bordeaux mixture and generally add Paris green; and after that, for the mildew, I have relied on the liver of sulphur and find it is very effective and does not spoil the fruit; it is nearly harmless in every way except against

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the mildew, and is easier to procure and no more expensive than the Bordeaux mixture. Regarding the other application, I would say that I have generally made use of an early spring application of the sulphate of copper, the same as for the powdery mildew on the gooseberry, and after that relied entirely on the Bordeaux mixture. A gentleman said something about the rot on the grape; and where you may perhaps have a rot due to the downey mildew it is my impression that you have the same rot that is troublesome a little further south that is known as the black rot, which is often very destructive, ruining the grapes entirely, and for that same disease I would use the Bordeaux mixture, after having sprayed very thoroughly with the copper sulphate solution in the spring. To have that first spraying effectual, you should thoroughly reach every part of the plant, and in doing so don't omit to spray the trellis and everything of that kind to destroy the spores that may be about at the time.

THE EXPORT OF TENDER FRUITS IN 1897.

A REPORT OF PROGRESS BY L. WOOLVERTON.

At the annual meeting of the Ontario Fruit Growers' Association at Kingston in December, 1896, the advisability of making some experimental shipments to Great Britain of tender fruits, such as peaches, tomatoes, pears, grapes and summer apples, was fully discussed. An address was given by the Hon. Sidney Fisher, Minister of Agriculture for the Dominion, to the effect that the Department of Agriculture was desirous of assisting Canadian fruit growers in this enterprise, and would like to know just what provision would be needed.

A committee, consisting of L. Woolverton, W. M. Orr, G. E. Fisher, A. H. Pettit and E. D. Smith, was appointed to reply to his enquiries. This committee met and recommended that shipments go forward during the months of August, September, October or later, of at least one carload per week, and of three or four carloads per week during the month of September; that cold storage would be needed at the point of shipment, as well as on the railway cars; that the varieties of fruit be as many as possible, and packed in the very best manner; that only the best stock be allowed to go forward; that an agent be sent to Great Britain to look after the interests of the fruit grower; that cold storage warehouses be erected at such points as can be agreed upon, where growers will furnish the amount of fruit required, and agree to buy over the warehouses at the end of three years provided the experiment proves a success.

At a meeting of representative fruit growers from Grimsby, Winona and Burlington, held at Grimsby on the 26th of January, 1897, two resolutions were passed, one asking for three warehouses, one at Winona, one at Burlington and one at Grimsby, each place to provide one-third of a carload per week; and another resolution, which, while approving of the former, recommended as a preferable scheme, the erection of one warehouse by the Department, and the guarantee to the shippers of a fair market price for the goods. The Department approved of the latter scheme, and decided to place one warehouse at Grimsby, provided growers there would agree to provide the necessary fruit to make up one carload a week and buy over the warehouse, provided the experiment proved a success. Nine prominent growers of peaches, pears, grapes, tomatoes, etc., agreed to the scheme, and on the 7th of September the first shipment was made, consisting of Bartlett pears, Crawford peaches and grapes for Covent Garden, London, England. In all seventeen carloads of our choice varieties were sent forward, the last car leaving on the 12th of October, loaded mostly with grapes. The two markets chosen were London and Glasgow.

The result of the season's experiment has been of great value, although not without considerable loss on the first shipments. It has been proved that our Canadian Crawfords and Bartlett pears are just what the trade wants in England, the latter variety being identical with the favorite English pear "Williams," known in France as "Bonchre-

ties." Some half cases, containing about six dozen each, of this pear sent over on the steamer "Georgia," arrived in excellent condition, and sold about October 1st for \$2.30 per half case, or the equivalent of about \$15 per bbl. This is sufficient to prove the market for such goods, especially for well grown samples; while, on the other hand, it has been proved that a second grade cannot be exported without loss. The first shipments arrived in an over-ripe condition. This was not the fault of the packing, for the fruits were gathered very green, carefully wrapped with paper and packed closely and firmly in shallow trays. In this way each fruit was separate, so that rot could not spread from one to another, and there was no chance for heating from bulk. Eight of these trays were put in a bushel case. The only fault in the package was that this bushel case was at first tightly covered at the top, which prevented a free circulation of the cold air, a fault that was remedied in the later shipments.

One cause of the failure of the first shipments was the temperature both in the cold storage warehouse at Grimsby and in transport, which was from 40° to 48°, with a still higher temperature, of course, inside the cases. This is altogether too high a temperature for the carrying of such tender fruits, without change of condition, and for this reason chiefly, added to the lack of free ventilation in the packages, the Crawford peaches and Bartlett pears arrived in the English market in an over-ripe and unsalable condition.

The first packages used were too large for peaches and pears, and too expensive, being bushel cases, each containing eight wooden trays, but towards the latter part of the season, a half case, holding about six dozen pears, was adopted, which proved much more satisfactory, for, while a case of Bartlett pears sold for 15s., a half case of the same, at the same sale, brought 9s. 7d. The temperature of the later shipments was held somewhat lower, averaging about 38°. If this can be still further reduced, perfect success must result.

The following are some extracts from the account of sales :

Fruit, ex.S.S. "Merrimac," sold in London, October 21st, 1897. 885 cases—loss £64.7.9.

Bartlett pears.....	30c. to	72c. per bushel case.
Clapp's Favorite pears.....	Nil to	\$2.07 " "
Tomatoes	78c. to	1.08 " "
Crawford peaches.....	Nil to	1.22 " "

The peaches and pears all arrived too ripe, and in a very wasty condition. Mr. Orndall expressed the opinion, when he saw it, that the fruit appeared to have been carried at too high a temperature. It was thought that the packers had put the fruit up too ripe, but this is not the case, for, on the other hand, it was shipped so green that many feared it would not ripen. The cause of the failure of this lot, therefore, was, in my opinion, entirely due to the high temperature at which it was carried.

Fruit, ex.S.S. "Sardinian," sold in Glasgow, 27th Sept., 1897. 542 cases. Net returns, £16.0.1.

Crawford peaches..	4½c. to	54c. per bushel case.
Bartlett pears.....	30 "	\$1.22 " "
Moore's Early grapes.....	2 "	30 " "
Tomatoes	26 "	1.34 " "

Temperature 48° F. for most of the voyage.

Carried at such a temperature, nothing but failure could be expected, but the fault was with the engineer of the "Sardinian," who was instructed to keep the temperature at 38° F. His excuse was that there were eggs in the same compartment, which he was instructed to keep at 35°. As a matter of fact, the temperature in some parts of the hold must have been about 56°.

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FRUIT GROWERS' ASSOCIATION.

Fruit, ex.S.S. "Iona," sold at London, October 7, 1897. 194 cases—net returns, £116.8.

Bartlett pears	Nil	to	\$1.03	per bushel case.
Tomatoes.....	21c.	"	30c	" "
Plums.....	Nil.			" "

Fruit, ex.S.S. "Vancouver," sold in London, October 10, 1897. 694 cases. Loss £37.12.6.

Bartlett pears.....	30c.	to	\$1.11	per bushel case.
Plums.....	Nil	"		" "
Peaches.....	12c.	"	1.09	" "
Tomatoes	24c.	"	91	" "

Mr. Orandall writes: "While these two shipments were some improvement on the fruit shipped by the "Merrimac," they are far from being satisfactory. The peaches are practically worthless, most of them decayed and rotten. All the pears are over-ripe, and in some of the cases decayed and rotten" He then proceeds to blame the package and the ripeness of the fruit when packed, instead of the temperature of the cold storage, which, I believe, is in fault in each case.

Fruit, ex S.S. "Kastalia," sold in Glasgow, October 15, 1897. 752 cases. Net returns £210.3.

Grapes.....	4c.	to	30c.	per bushel case.
Tomatoes.....	4	"	\$1.23	" "
Tomatoes, half cases.....	4	"	75	per half case.
Duchess pears.....			1.64	per bushel case.
Bartlett pears.....	30	"	1.22	" "
Anjou pears.....			2.07	" "
Ribston apples.....	1.77	"	2.58	" "
Fl-mish Beauty pears.....			2.01	" "
Crawford peaches.....	2	"	97	" "

Fruit ex S.S. "Numidian," sold in Glasgow, October 15, 1897.—336 cases.—Net returns, £43.16.5.

Crawford peaches.....	Nil	to	\$3.66	per bush case.
" " on lot of 87 cases made net returns of \$92.02.				
Grapes.....	48c	"	2.68	" "
Tomatoes.....			1.44	" "
Bartlett pears.....			2.00	" "

Fruit, ex. S.S. "Hurons," sold in London, October 21, 1897—786 cases.—Net returns, £39.19.10.

Bartlett pears.....	73 c.	to	\$2 92	per bushel case.
Duchess pears.....	\$1.64	"	2 19	" "
Anjou pears.....			1 34	" "
Louise pears.....	\$3.41	to	3.90	" "
Howell pears.....			2 07	" "
White Doyenne.....			3.01	" "
Pesches.....	73 c.	to	2.44	" "
Grapes.....	24 c.	"	1.36	" "
Tomatoes.....	\$1.23	"	1.71	" "
Tomatoes.....			61	half

Messrs. Garcia & Jacobs, the salesmen, write: "There is no doubt that the fruit will suit the London trade, the eating quality being exceptionally good. The general appearance is about equal to that grown here and in France, but not equal to that in California. . . . There is no reason to doubt that if the fruit can be made to stand the journey, when once the difficulties of packages and temperature are overcome, the results should be satisfactory."

Fruit, ex. S. S. "Labrador," sold in Liverpool, October 29, 1897.—388 cases.—Net returns, £36.3.2.

Grapes	40 c. to	\$2.40	per bushel case.
Tomatoes	64 "	2.04	"
Peaches	\$1.44	2.40	"
Pears	1.46	2.92	"

Fruit, ex. S. S. "Gerona," sold in London, November 4, 1897.—597 cases.—Net returns, £7.10.8.

Grapes	30 c. to	55 c. per case of 20 lbs.
Duchess pears		\$2.92 per bushel case.
Anjou pears		3.00 "
Louise pears		3.53 "
Tomatoes	48 c. to	80 "

Mr. Orandall wrote concerning this shipment: "The tomatoes were in fine shape, and the size selected are more in favor than the large tomato, a medium size being preferred. Buyers object to mixed varieties of grapes in the same box, and would prefer each variety packed by itself. I regret to find a prejudice here against the flavor of the Canadian grape. This must be overcome before they sell readily and realize their value."

The consignee wrote: "We beg to advise you of the arrival of the "Gerona." Everything did well, with the exception of the grapes, of which the peculiar flavor is not appreciated in London. Grapes from Spain and Portugal are being brought to our market in large quantities, in big bunches, and being sold at 2½d. to 3d. per pound. The pears did splendidly, and, as the season advances, the results are sure to be satisfactory for good apples."

Fruit, ex. S. S. "Sardinian," sold at Glasgow, November 2, 1897.—1,029 cases (mostly grapes).—Loss, £31.16.5.

Grapes	16 c. to	90 c. per case of 45 lbs.
Peaches		\$1.22 per bushel case.
Kieffer pears		2.68 "
Duchess pears	\$1.95 to	2.80 "
Anjou pears		2.19 "
Sheldon pears	\$1.95 to	2.19 "
Tomatoes	30 c. to	85 c. per half case.

It is worth noting that about the twenty-first of October California pears and peaches cease to arrive in Great Britain, thus leaving Canada a special opportunity to capture the market for these fruits from the middle of October onward. It will, therefore, be worth our consideration whether we can hold back our Bartlett pears and Crawford peaches in cold storage in Montreal until about the 10th or 15th of October, before forwarding them. Also, whether we can grow such desirable late varieties of pears and peaches as will suit the British market at the time above mentioned. The Louise pear, for example, succeeds beautifully in Southern Ontario, especially when grown as a dwarf, and the same may be said of the Duchess and the Anjou. Another magnificent late pear is the Clairgeau, which would be one of the finest for the export trade. Even the much abused Kieffer would export in fine condition.

TOMATOES have succeeded as well, or better than any other fruit, so far as condition is concerned, and prices have been good, considering that the variety Ignatum was too large to suit the English taste. Some smaller, round, smooth variety will give excellent results.

GRAPES have been a complete failure, the fruit having been about given away, the very best not bringing more than one cent a pound, the cost of transportation. The salesmen write:—"The grapes are of no use here, the peculiar flavor not being very palatable; and in quality they are in every respect inferior to those grown in Spain and

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Portugal—thin skinned, white, sweet grapes, which are brought here and sold from four to six cents a pound." A consignee in Liverpool, however, writes more favorably, and we hope yet to create a demand for our grapes that will ensure a profitable trade.

PEACHES. In the export of this fruit there appear to be great possibilities, both of loss and of profit. For example, one shipment of one hundred and thirty cases of beautiful Crawford's reached Glasgow in such bad condition as to bring the shipper in debt \$73, besides the loss of his fruit, valued at \$325, or a total loss of \$398; and another shipment of forty cases returned a net profit of \$77.01, an average of \$3.66 per case.

EARLY APPLES were so great a failure in crop this season that it was impossible to make up any cases of them for export. Next year, should the crops be first-class, some experimental shipments will be made, beginning with Red Astracan and Duchess in August, Gravenstein, Ribston and Blenheim Orange in September, and Fameuse, Wealthy, King and Cranberry Pippin in October. These are all excellent varieties, of beautiful color, which are bound to bring the top prices in any market.

Altogether we can report encouragement, although the season's shipments on the whole have been a serious loss. We have learned (1) to use smaller packages with better ventilation, (2) the importance of lower temperature in transportation, and (3) that fruit should be placed in a cool room as soon as gathered, and cooled even before it is packed, in order to attain the best results.

With these conditions observed, we expect to report success next year, such as will lead to private enterprise in the export of our tender fruits.

The temperature at which fruit should be stored for transportation long distances is one of the most important points to be determined. We all know that a ripe Crawford peach will soften on a hot day in twenty-four hours, so that it cannot be shipped even to a near market, and that the greenest Bartlett will yellow up and become mushy in a few days if shut up close in a tight package and kept at a high temperature. Evidently, therefore, a low temperature is necessary to keep such fruit for two or three weeks' transportation to a distant market. Evidently, also, this temperature must be kept up from the hour the fruit is packed until the time it is opened for sale.

At the great cold storage warehouses at Chicago, where our Canadian fruit was kept for one year for the World's Fair and placed under care of the writer, who was Dominion Superintendent of Horticulture, the best results were obtained where the temperature was held at about 33° F. Fruit so held came out in perfect condition.

The Genesee Fruit Company, Rochester, N. Y., aiming at the best results, engages to hold certain products in cold storage at the following temperatures; Apples, 30-33°; grapes, 36°; pears, 35°; peaches or plums, 35°; quinces, 35°.

Now, if it is possible to have our fruit carried at an average temperature of 35° F., I believe we are sure of success, and I would not be afraid to venture to ship freely.

Regarding our packing, we can never expect uniformity under the present method of each shipper packing his own fruit. Some will do the thing well, and possibly get a reputation for their brands, but the multitude will do it carelessly and get a bad name for Canadian fruit.

If it were possible to encourage the establishment of packing companies, managed by experts, to do the packing for export, the difficulty would be overcome. Such companies would build cold storage warehouses at central points, and adjoining packing sheds, and agree with certain shippers to receive a certain quantity of fruit per day, and pack the same in the best manner for a certain sum per case, loading the same in refrigerator cars from day to day. Each case would be stamped with the trade mark of the shipping company, and also with the owner's mark, so that the returns would be made direct to him from time to time.

THE PRESIDENT: This is a very important paper, and I think you will want to discuss it pretty thoroughly. Probably before going into the discussion we had better hear from Mr. Fisher on the same subject.

Mr. GEORGE E. FISHER: The operations at Burlington we conducted so irregularly that I have not any formal report to make. In the first place, we were disappointed in our calculations on the cold storage warehouse, and had to try it without that advantage. We held a little meeting and decided we should be doing something, and if we ever did anything that we would have to make up our mind to go it alone. We therefore decided upon shipping a few Bartlett pears as soon as they were ready, and also a few boxes of plums; we had some apples and tomatoes, and I think that these constituted our shipments. I am altogether without account sales, for the reason that when we decided to ship we felt that we were without any business connections in this matter, and it would be necessary for us to make use of our friends to get to our destination. I addressed a letter to Messrs. Hart & Tuckwell, of Montreal, with whom I have been doing business for a great many years, and asked them to act the part of forwarders and to get our shipment on board the ship with as little delay as possible and in the best possible cold storage. This they undertook very readily to do. They took a great interest in our undertaking, for they said we deserved encouragement; so we put up a little shipment and sent it down there in a refrigerator car. When it got to Montreal, much to our disappointment, we were refused admittance to the ship. There was a vessel there going to Liverpool. Our shipment got there at 5 o'clock in the morning. It laid in Montreal that whole day till midnight in the heated city before they would allow it to go on board the vessel, and this merely because a shipment of butter that was expected had not arrived. We were at a great disadvantage in this way. It appears that the Government have subsidized the vessels, and one of the conditions of the subsidy is that butter and eggs shall have a preference in cold storage. We were the more disappointed because of this delay as we had been given to understand by the Minister of Agriculture that if we undertook any work on our own account we should have the privilege of cold storage; that was promised us in the winter. Well, our first shipment got away with this much delay. It reached Liverpool, the report said, in good condition. The pears sold at 17s. a case. This is the Burlington cold storage case. (Sample shown.) It is four-fifths of two cubic feet in size. Here is the old apple case that we used, which is exactly two cubic feet. (Sample shown.) The apple case is one-quarter larger than the other. Our pears sold at 17s. a case, and the Montreal house shipped goods in connection with ours, and they got account sales showing the sales of their goods and ours too. They sent me this account sales to look over, with the request that they would be returned to them; therefore the account sales in connection with our portion are on file in the office of the Montreal house, and I have not seen them since shortly after I got them, for I returned them without delay, so I am quoting entirely from memory, and it is a good while ago now.

Mr. McKINNON: Was the average price 17s.?

Mr. FISHER: They sold them at the uniform price of 17s.; that was the price that they all sold for—those that we shipped on that occasion; it was not a large quantity.

THE SECRETARY: You don't remember the number of boxes?

Mr. FISHER: No, I don't remember the exact number of boxes; there was not a great number of boxes—in the neighborhood of ten. Then our tomatoes we shipped green. We didn't know in what condition of ripeness to ship them, and when they got there they were still green, and of course they were not decayed and rotten, and they sold them for a trifle more than enough to cover expenses; but we learned that we needed to know what condition of ripeness tomatoes should be sent in. We received our cable returns for the sale of the first shipment of pears just a day or two before the Government shipment started, so that we were in the field early. As soon as we got this word we found it was necessary for us to know something more of the condition in which tomatoes should be sent, and the next shipment we put them in four conditions of ripeness—one quarter ripe, half ripe, three quarters and fully ripe—and the returns showed that those that were shipped in a half ripe condition reached there in perfect order, and sold at a fairly good price, but the average for these different conditions of ripeness was not large, although those that arrived in good condition was all right.

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Mr. BURRELL: What do you mean by calling them half ripe—just colored up a little?

Mr. FISHER: One half colored. We sent the tomatoes quarter colored, half colored, three-quarters colored and fully colored. Now in this second shipment we had some more Bartlett pears, which I got from a neighbor. They were entirely ripe, and those of you that have seen the letter that was published as coming from the Liverpool firm will know in what condition those pears arrived in Liverpool—in splendid condition, just as good as if they had been opened up in Montreal. Now during these shipments we had the advantage of cold storage at Montreal. It was during the season of small fruit shipment, and plums were going still, and we put our cases of fruit in the car with those other fruits to Montreal; but a little later in the season these cold storage cars stopped and we were without even that accommodation, and we had only the alternative of shipping by express at a high charge—about forty cents for one of those cases to Montreal—or shipping by boat at eight cents per case, which we preferred to pay, and we put up quite a large shipment of mostly pears; there were some grapes, I cannot tell just what was in those shipments, but in all there were 398 cases. We put them on the old propellor "Ocean" down at the Burlington Beach canal, and they were two or three days getting to Montreal, and after that they went into cold storage on the vessel. They went to Bristol, and that shipment of 398 cases sold at prices that netted us at home \$570—in the neighborhood of \$150 a case net. We afterwards sent another shipment of 169 cases by steamer "Ocean," and this shipment realized \$340 odd, or a little over \$2 a case clear.

Mr. BURRELL: How much would that case hold?

Mr. FISHER: Four of those cases will just a little more than fill a barrel. We got 10s. for Kieffer pears in Bristol. In Liverpool the Duchess pears sold for about 12s., against 7s. for Kieffer. Now, in our experience not only in these cold storage shipments but in all shipments, I take it as a very important consideration to have the fruit thoroughly cooled before it is put into the case. I put great value on that. It is difficult for us to do it at all times, because we sometimes have only a little time to do in. For instance, the Bristol ship leaves on Thursday. In order to reach Montreal by cold storage car we have to ship on Monday night. Monday night and Tuesday night are occupied in reaching Montreal. We leave one day for them to get the shipment on the vessel. The vessel is supposed to leave at daylight, and if the weather should be warm on Monday—if there should be a hot sun or a hot wind—it is almost impossible to get this fruit picked and cooled to go in the car. You can do it nicely for the Liverpool shipment when the vessel leaves on Saturday, for in that case we have a day or two to get ready. So you see that it is not always practicable to have the fruit cool when we have not the advantage of a cold storage building, and in every case where we shipped pears put into the packages hot we found that the prices realized were from one to two shillings below those realized for pears that we put up cold. In one shipment I put about eighty cases of my own, and about one-third of those had been put cooled and two-thirds put in warm. I think I received 9s. a case for those that were warm and 11s. for those that were picked cold. In shipping to Montreal I think that it is just as much of a consideration to have the fruit thoroughly cooled before it goes into the case for the Old Country. Now with regard to shipping into cold storage in Montreal and then from there at a later date, unless there is greater pains taken to keep the fruit right in the cold storage I have very little confidence in it. My instructions have been to keep my fruit at 35°, and I contend if they do not do that they are liable to damage. (Hear, hear). I have been very much inclined to enter an action against them for the way they have treated me in this regard. I shipped fifty cases of Bartlett pears out of cold storage in Montreal. These had been shipped to Montreal some time previous, and had been stored there. They were not wrapped, because we expected to send them on, and hadn't taken such pains in the selection of the fruit as we do in what we send direct from Burlington to the Old Country market. These pears arrived in Liverpool out of condition. They seemed to be all right when they left Montreal, but that shipment was a failure, and that is the only loss we have had in our shipments. In the first shipment we made by the steamer "Ocean" we had a few cases

of grapes. They went to Montreal on the boat and from there in cold storage. They arrived out of condition, and sold at less than cost of transportation; and I believe those few cases of grapes, less than a dozen, were the only packages that didn't pay their way. With the exception of these grapes the packages were all fairly remunerative, and on the whole the Burlington people have made money by shipping to the Old Country. I have done considerably better than we could have done in Montreal with our pears. The worst we have done is about \$6 a barrel, and the best would be \$15 to \$16 a barrel. We have made a good average and feel that we have made lots of money by shipping to the Old Country.

Mr. BURRELL: You are speaking of net prices now?

Mr. FISHER: No; the \$16 a barrel would not be net, but the other prices I have quoted would be net.

Mr. BURRELL: Six dollars a barrel would be net?

Mr. FISHER: Yes, and \$8 a barrel. We got \$8 a barrel net for a good deal of the pears that went by the "Ocean." Now, as regards cold storage against ventilated chamber, I have a friend in Toronto who has been shipping some this year in the ventilated chamber. He packs his tomatoes and pears in peat moss and they do not go into cold storage at all, but they go into a well ventilated part of the vessel, and those packages have arrived in Bristol in first-class order, just as good as those that went in cold storage. Now, if we can ship in a ventilated chamber in safety it will be much more profitable to the shipper, because the cost of transportation was so much less. Between Montreal and Bristol the charge per ton, that is forty cubic feet of space in the vessel, is 17s. 6d., and the additional charge for cold storage is 7s. 6d., making a total of 25s. Now this larger case here containing two cubic feet go twenty cases to the ton, so that twenty of these cases shipped to Bristol would cost 25s. The small case, being four-fifths the size of the other, would go twenty-five to the ton, so that the cold storage to Bristol would cost us exactly one shilling a case.

A DELEGATE: What do you mean when you speak of cooling the fruit?

Mr. FISHER: The only way we cool the fruit is to pick it and pack it in the forenoon up to the time that it gets warm from the heat of the day—the sun and the warm wind. Then I don't want any more fruit packed that day. We pick it and leave it on the table and leave it to cool, let it lie over night and let it cool off all that day. My packing house has sliding windows; it is on the upper floor, and we leave these windows open and the wind plays through them, and this fruit gets pretty well cooled off by next morning, and we let our pickers go on and pick all the fruit they can on the following morning while it is cool, but just as soon as the fruit gets warm we don't want any more of it mixed with that cool fruit; we put it by itself, and then there are girls that wrap these pears in paper, and we go on with our packing, and in the field they are picking and putting in another part of the building.

A DELEGATE: Suppose you have a very hot night?

Mr. FISHER: It will cool off. They will cool off very much more in the night in any kind of room. I think this is a necessary process because of the process of the cold storage people. They have a room called the tempering room, and if fruit goes into their warehouse hot, they don't put it into the cold storage at once; they put it into the tempering room. Within a month I visited a cold storage building in Toronto where they had a large number of baskets that were put in during the Bartlett pear season, and the pears were still in splendid condition, having been kept at a temperature of thirty-eight degrees. They had been sold to the Queen's Hotel, and one of the conditions of the sale was that they should be ripened for immediate use before being delivered to the hotel, and when I called there were a number of baskets sitting about the stove on the floor being ripened for delivery to the hotel. They had been there three days when I saw them, and they were still hard after being kept for several months.

Prof. TAFT: How ripe did you ever put pears in cold storage and keep like that?

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Mr. FISHER: I never put it that way, but these pears that went to the Old Country were just as ripe as they could be, but they were not soft, and I was very much surprised myself at the report which came from Liverpool regarding those pears; and there were a number of pears just ripe enough to get soft, but they were not soft. The Burlington people in their operations this year have been trying all such features of the work, and endeavoring to get all the information they can. We have not aimed at making money, but what we were after was to get the fruit there in good shape and find out what we could do.

The SECRETARY: Do you think your case is sufficiently ventilated? The case we are proposing to use is much more ventilated than that.

Mr. FISHER: We have not used any other case, and I have given you the results of using this case. It may be that a more ventilated case would be better, but we think that that case is sufficiently ventilated. When we fill our case the fruit stands about three-quarters of an inch above the edge. We have a frame in which we place an ordinary screw press. When the box is full we just shove it into this frame; we place the cover on it just as you see it here, and then we have a little frame made of pieces of wood that sits across the top, and two slats, and these right across the cover; then we bring down the screw and press this home, which opens up the spaces at the sides more than you see them open now, and they remain so. It is ventilated at the top, bottom and side. The Toronto people say they do not want a ventilated case, they would just as soon have a tight barrel as an open barrel; they say they have just as good results. They say the Chicago people have taught them that. I don't know from experience which is best.

Prof. ROBERTSON: Do you use the same case for tomatoes?

Mr. FISHER: For shipping tomatoes we get some little baskets made like they use in the twenty-four quart berry case, only they are as long as the box is wide, and so wide that three of them would reach the length of the box. We put these in, fill them with tomatoes, and then put a slat on the top. They were as deep as one-half of the box, and then we put a row of these baskets on the top and put on the covers. Now about the one-piece sides. A great many cases they made for me were two-piece sides, although the contract was for one. When they come to make them up they said they hadn't the material, and we allowed them the privilege of using two-piece sides, which we consider was not at all to our advantage, on the consideration that they would use this iron (showing two narrow strips of hoop iron about nine inches long and one inch wide). Now this is an idea of my own which the Coleman Lumber Co. give me great credit for. They say they intend to use it on their boxes right along. In shipping the old apple box to the Old Country, a number of my friends at Burlington said they could not sleep after a shipment went away unless the boxes were banded—they were afraid they would go to pieces in handling, and consequently a good many of them were banded; and when they got to the Old Country the consignees in Glasgow complained fearfully of the bands—they said they could not sell them because they went right into private families, and the people could not get the boxes open. (Laughter.) They said the ordinary family had no better kit of tools than a poker and a pair of tongs, and they could not do anything with the boxes. (Laughter.) In order to do that we set ourselves to strengthen the boxes without putting the band on the outside, and when we consented to take the two piece sides, the maker of these boxes consented to put that piece of steel across the end before they nailed the sides on. It goes inside the covers. The nails go through it, and these two pieces of steel will carry pretty nearly a ton. The box is practically indestructible with that band in there.

A DELEGATE: You say you prefer a four-fifths box to a bushel box at the same price. Why do you prefer that size to a bushel?

Mr. FISHER: I don't know that I do. When we shipped that box to the Old Country first, they sent us a message from Liverpool on no account to change that box—that we were shipping the finest package that came to Liverpool. You can stow that box on the top or sides or endways, or any way you like, and it will fit. The vessel people

like it, and they like it in the warehouses, it was just what suited them, and they wanted nothing else; but it was only because this Burling' on people had the boxes made up and the material all cut that we were using this box. However, for our cold storage purposes it is certainly a very fine box. We find it a useful package. I don't know whether it is too close or not.

Mr. WESLEY SMITH (Winona): There is an idea that they want the air to circulate free. If packed so solid will fruit carry as well? Should they be separated?

Mr. FISHER: I don't want to appear as an expert. I really don't know anything about this business except what we have learned from the little experience we have had this year.

Mr. BOULTER: You are satisfied that the lumber should be thoroughly seasoned? It would affect the fruit to put it into new made boxes?

Mr. FISHER: We found that by experience in former years. It is our practice to get a number of boxes made up early in the season. Last year I shipped 5,000, and we didn't have enough ready, and we had to go back to the factory for more, and word came from the Old Country that the fruit tasted of the wood.

Mr. BOULTER: I have just got a letter from Mr. Larke, our Canadian Commissioner at Sidney, Australia. I sent him some goods, and amongst others evaporated apples, and the complaint is that they taste of the pine. They were put in new-made boxes.

Mr. FISHER: That was another reason why I think these basswood boxes would suit us better. There is no doubt basswood is better than pine to ship fruit in, but these boxes were sold for fifteen cents when they were made up, and they say they could not afford to make them at the price they sold them to me at, but they had them there, and in order to get rid of them they were willing to supply them at the same price at which I could buy pine boxes. The printing of course was a disadvantage, as we had to do it with a stencil and shoe brush and ink, and it is a slow process, and we cannot do as neat a job as they can with the machine. My idea in bringing this box here was to learn all I could from criticism. This strip of steel saves the boxes from destruction in handling.

The PRESIDENT: I would call on Prof. Robertson for his address in connection with this subject.

CANADIAN FRUITS FOR THE BRITISH MARKET AND COLD STORAGE.

Prof. ROBERTSON, who was received with applause, said: I have no verbally prepared report for this afternoon, but I am very glad to be here. I came a good deal more to learn how our Department could serve the Fruit Growers than to try to offer you very much of advice and suggestions. At the same time, having learned a good many things during the last summer about cold storage and transportation, I brought with me, in addition to what I carry in my head, as full reports as I could collect of all that the English people said about our fruit and our packages, and the advice they give us as to how we could best meet their wants. The fruit men of England are like the other importers of England—they insist on having things done their way, even if that be not in our judgment quite as good a way as the way we suggest; and so we have been trying, so far as we could during the progress of the season, to send over, in the shipments that we sent under the supervision of the Department of Agriculture, fruit packed in just the kind of way they said they wanted it. But before I speak of that I would like to make a very few observations on the two addresses we have just heard, to make quite clear one or two matters that didn't seem to me quite clear in regard to what they had presented. Now, it is known without explanation from me that the Government did provide cold storage on steamships for the carriage of perishable products. That was begun first to carry butter—that being the only product that then sought that accommodation—consequently all the agreements were drawn up with the steamship companies saying that fresh made creamery butter should always have the

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preference. But if more accommodation is wanted for fruit, then extra accommodation can be provided. It would not be fair to restrict the butter accommodation in favor of anything else. This limitation was put in there, and I would like to make this explanation on behalf of the Minister: That while butter has the preference, on every steamship there is space for two carloads reserved for such as the Department may indicate to be trial shipments of any kind; and if Mr. Fisher or his friends had intimated to the Department at all at any time that they wanted some space for trial shipments, they could have had a share, at least, of the two carload space, and then there would be no shutting out of any trial shipments for want of accommodation. I want to say that, lest it might seem that there was no accommodation for trial shipments; and the steamships are not bound to reserve space for any shipments unless space is engaged four days before. The steamship people would not be able otherwise to fill the holds. Then I am very much pleased with the report that has been made on the shipments from Burlington. I had a pretty good eye on some of those shipments in Montreal quite often, and could see the progress of the work, and was very much satisfied with the way some of it was being done. I was specially well pleased with the extra good quality of the fruit offered this year—the evident care in selecting large sized, uniform-sized and well-shaped specimens. I am no authority on fruit culture, but I do know the size and shapes good fruit should have, and I pay them this well-deserved compliment, that it was the best I saw go from Montreal. Then the one matter that perhaps I misunderstood Mr. Fisher in stating, and with regard to which I took the opportunity to interrupt him, was this: That while the whole cost of carrying a package in cold storage from Montreal to the vessel might be a shilling per case, I thought the point he was discussing was the extra cost of cold storage and therefore the gain to the community of shipping in ventilated chambers where extra cost would not be imposed. The extra cost for the cold storage service would be about 8c. per case that size (sample shown). Now, rather than run any risk at all, 8c. is a very safe investment to ensure safe carriage in any kind of perishable fruit or other products. Then in regard to the report that Mr. Woolverton made in behalf of the shippers of Grimsby I would like to make this observation: That the shipments while under Government auspices were not under the direction of the Government in that full sense. The Government, through myself in charge of that branch, made recommendations in regard to the packages of fruit, but took no control beyond the recommendations, which the shippers, I think, did their best to carry out with the exception of the first packages, which were procured before the Department's judgment was taken, and these, I think, were too large and had one very serious fault which I shall point out when I speak of tomatoes. The Department was merely seeking to provide accommodation for the safe carriage of fruit such as the shippers themselves would pack and put on the railway cars for us. Then the other matter that was not perhaps quite clear, at least to my mind, was that the failure of the first shipments of fruit to carry safely was owing to the fact that these shipments were carried at too high a temperature. Now, that is quite in accordance with my own knowledge of the facts of the case, but that was not because the temperature in the hold of the ship was not cold enough. You may have fruit in a package which, because of the generation of heat in the package, will keep the fruit much higher than the registered temperature of the hold of the ship. The temperature in the hold of the ship was kept at the point we requested in each case except the one mentioned by Mr. Woolverton, and while the fruit was carried in too high a temperature it was not because of the lack of facilities for cold storage, but it was because the fruit was so insulated in the package that the cold storage would not cool the fruit in the packages. With these explanations from my knowledge of the matter this year I would like to lay before you the report, and then get what I can from you of information as to how this business can be carried on most successfully. Allow me in a few moments of introduction to assure you that the Department regards this work as being so very important to the whole fruit-growing industry of Canada, that the Minister authorized me to say that no pains and no reasonable expense that is necessary will be spared to get the Canadian tender fruits on the British market in the best kind of packages and packed in the best way and delivered in the best condition. (Applause). If shippers themselves

desire to make experimental shipments and will get carload lots, the Department will provide the cold storage expense, railway cars from the starting point to Montreal, will keep a man there as we did last year who will see that the fruit if not put immediately on board the ship is cooled or put in cold storage, and will ensure such space on the steamships thoroughly cooled as the fruit-growers will notify us beforehand they want. Of course you cannot put space in a ship in a week, but any authoritative information in regard to the amount of space wanted in time to provide that, the Minister says will be provided this year for trial shipments of fruit of the tender kinds. Now it is very well to discuss varieties and methods of growing fruit, but unless the fruit can be marketed at a profitable price of course the whole business must fail—(hear, hear)—because a large orchard with a small demand for its fruit is only a source of expense to the man who owns it. Now, how can the demand be made steady, and be made as far as possible at profitable prices? Well, first of all by taking away as far as practicable the risk of loss to the fruit merchants, the men who now in Canada handle the fruit. During the summer I have taken a great many opportunities of going into the fruit shops, both retail and wholesale, and talking to those people. One thing that keeps a man from paying even a fair price is the risk he runs of having the fruit somehow go bad on his hands. Now, I think that main risk is caused because of the fruit leaving the fruit-grower's hands in a warm condition. That applies to nearly all kinds of fruit that I have seen this year. If the fruit could somehow be cooled before it leaves the place where it is grown its natural term of life would be nearly quadrupled, and then that risk would be very much lessened. There is a tremendous loss in Toronto this last year from peaches going there and going bad on the streets, in the shops, even with cold storage there, because they get very warm, and men had to get rid of them right off before they got worse. If they had been cooled before they started, or held back a few days, it would be a great protection to the whole fruit-growing interest. It would pay the fruit grower to put up a small cold storage building in his own place at a cost perhaps of \$250 complete, enough to hold five or six tons of fruit. I only suggest that, now, as being a most desirable means whereby the fruit-grower can protect himself from great loss and ensure that the merchants who get fruit from him will have more confidence in the future trade with him. Then the next matter that will affect the demand for fruit is to make it possible for the consumer to get the best quality of fruit in the best condition. It is not easy in Canada in many markets to be quite sure you can get a perfect package of fruit in good condition. If you buy California fruit you can get a package with every single specimen of fruit like every other one; but if you buy a basket of Canadian grapes or pears or peaches you will find some very good fruit and some rather poor fruit; not the good always on top. I am not speaking at all of any tricks of the trade. I am speaking now of the need of catering for the best class of customers by a uniformly fine article which they can rely upon being the same all through. Now, a cool place to handle fruit will give every grower a chance to send that kind of fruit to market, and that will mean that every family both here and in England, and in England particularly, would eat twice as much and three times as much and by-and-bye, six times as much Canadian fruit as they now consume. I have been enquiring of the householders in Ottawa this season why they don't eat more fruit. They get home one basket, and one part of the fruit is good and two-thirds bad, and they don't buy more. That applies to all perishable products, so it is most essential whatever the Government may do in cold storage, either at warehouses or at steamships, that every fruit grower should provide himself for some convenience for protecting the fruit as well as he can protect it, so that both he and the merchant will have more confidence that they are not likely to lose what they buy. Now, the home market is the best market for everything we grow in Canada. I say that without any qualification at all—that out of every \$10 worth grown in Canada \$9 worth is eaten at home. But if you have a dollar's worth at home that the people do not want, then the other \$9 worth is not worth so much; so that while the home market is the market to cater for, the home market price may be determined by what you can get in the foreign market, as the rate per basket of many kinds of fruit in a few years will be determined by the rate per basket or case you can get in Liverpool or Glasgow or London. That brings me to speak of this next, that the price of Canadian

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fruits, at any rate in Great Britain, in the meantime—when I speak of the meantime, during the last two years—is determined by the condition, as far as I have been able to observe, with the single exception of apples—having found no uniform range of prices arising from the variety of fruit. Now, in listening to the discussion about pears this morning I found that the pears that are spoken of as not being so good sold just as high as others in the shipment we sent forward if they landed in good condition. The first requisite in shipping fruit to England is to get fruit there in good condition, and not to have it get there in what they call a sleeping condition, that is, a condition where the fruit is firm but just ready to be wakened up into decay by the least little bit of heat. That means that the retail men will buy it only if they get it at about 25 per cent. of its value. I do not know that it is right that that should be so, but the fact is that it is so, and the wholesale men say that they cannot get the retail men to buy fruit that is sleepy—that is too ripe when it started from the other side. Then the next thing that gives fruit value in Britain in regard to condition is that the fruit shall be seen to, that it will have reasonable keeping qualities there—and the longer the life period of the fruit there the higher the price you can get for it. Pears that land in England to be eaten within three days necessarily will fetch one-third the price of pears that land there in such a condition as to be kept for eight days—about that difference in regard to comparative value. That is gathered from correspondence as well as the results we have had from our own trial shipments. Then a minor matter, which has been counted a major matter, is the quality of the fruit in regard to its appearance and flavor. In a few years, when they get to know our fruit as being reliable in condition, they will discriminate as to flavors; but just yet, except in apples, they don't discriminate as to varieties—they merely want the thing sound. So if you can send a high-flavored fruit also sound, so much the better; but I do not think for one or two years you will get any more money per case for them than for the commoner fruit which will have a good color and be in a sound condition. Then, that I might glean from you some information as to what we should do during this coming year, let me instance what seemed to me the great difficulties of getting our fruit in England in the best way. Everybody knows there are difficulties in general. I want to indicate some of them in particular, so that you will put your best thought at work and be able to suggest the best means of meeting some of these difficulties that have not occurred to us. The main difficulty is that of climate here; that is most capricious, especially at the time that the fruit ripens. When we sent the two largest lots of peaches from Grimsby the temperature was recorded as being over 90° in the shade. Now, temperature like that, you see, does not give you any chance to cool fruit by ordinary ventilation, except the least little bit through the evaporation of the fruit itself. That accounts a good deal for the very over-ripe condition in which the first peaches landed, because they were picked at a temperature of 90° and there was no way of cooling them thoroughly in the length of time available between the time they were packed and when they went on the car. That makes me think again that some simple cooling convenience should exist on every fruit farm where a man expects to handle his fruit in the best way. Then we have distances from market, which is a very serious thing, but it is not such a great thing if you can get the fruit to carry there safely and at not too great a cost. Now the actual cost of shipments from Grimsby to London was as follows:

Freight to Montreal, counting those large sized cases	19c.
Wharfage and marine insurance, and those incidental expenses.....	2½c.
Ocean freight (including cold storage charge)	31½c.
Consignees' charges on the other side, such as delivery charges, fire insurance and hauling, and all those things	17c.

Making a total of 70c. a case into Convent Garden, England, from Grimsby, with additional charge of 5 per cent. commission for the sale and guarantee. That would vary more as the fruit sold high or low. Now the cost to Glasgow is 64c. per case, the Glasgow delivery being rather cheaper than the London delivery. The cost to Liverpool would be a little less still than the Glasgow case—being 60c. per case to Liverpool. Perhaps I might interject here a statement of what the fruit would realize as sold in these markets. I take first the fruit as sold in Glasgow, which did not give as good returns as

London for, perhaps, two reasons: the Glasgow market, so far, has received no California fruit, as far as I can learn, and therefore the people are not prepared to buy imported fruit, as they are in Convent Garden; and then, besides, the first shipment that went to Glasgow was the one that was carried at a temperature of 48° by the ship's instructions to keep the hold at that temperature to save some eggs that had been put in. Of course there was a clear case against the ship if one should wish to push it, but in the experimental work we did not want to lay the blame on anybody. But that was one reason why Glasgow shipments did not realize as much at any time as the shipments to London. Take the peaches first. They landed in very poor condition, and I give you about the best price of those that went to Glasgow. There were some fancy dessert peaches by L. L. Hagar sold at only 4s a case, that netted 29c. at Grimsby. Then others at that rate. Then grapes we practically gave away, and I do not think because they were given away that therefore we should not make any more shipments of grapes. Where the grapes were put on the hotel table the guests would pick them off and spit them off on their plates. A big hotel dining-room was watched, where the Canadian grapes were put on in the best condition, and that was the result. They were put on every day for a week, and by the end of the week they were eating the grapes off the plates. (Laughter.) One sees the same thing by any Englishman and Scotchman and Irishman coming to this country. They don't like Canadian grapes, but in a while they devour as many of them as any of the rest of us.

Mr. BURRELL: More.

Prof. ROBERTSON: Yes, I dare say they are energetic and of good capacity. So I don't think because the grapes were given away, and that was the cause of a great deal of our loss—because there was a larger quantity of grapes sent than anything else, and the expense was piled up in carrying the grapes—that was a bad investment; and from my standpoint I am prepared to say this, that it would be a good investment to send as many as ten carloads of grapes next year over the country as a whole even if they didn't much more than meet expenses—(Hear, hear)—for we are growing so many grapes that we must find an outlet for our surplus, and, perhaps, if you can educate the English people to eat grapes they will take kindly to our grapes as they did to our tomatoes, which are now eaten in enormous volume from the Canary Islands and the Channel Islands and England itself. The pears sold from 15s. a case downwards. Those sold at 15s. a case realized at Grimsby \$278, that is counting every expense. Those that realized 8s. 3d. a case netted \$1.24. Then tomatoes realized all the way from 5s. 2d. —57c. at Grimsby—down to 31c. at Grimsby. Then there were a few lots which were practically given away altogether. Then of the shipments that went to London—and these I quote from are the very highest prices that were realized—peaches were sold at 15s. 4d. a case, realizing at Grimsby \$2.84 a case after all expenses were off. Peaches were sold at 12s., realizing \$2.04 at Grimsby, and these were not landed in the very best condition—that is, in as good condition as I am quite confident we could land them in with the experience that we gained in regard to a lot of little things which I will refer to when I speak of packages. Pears were sold at 16s., realizing \$2.95; at 14s., realizing \$2.49; and 12s., realizing \$2.04. The highest price realized for Bartletts was 12s., and for the Louise Bonne 16s. and 14s.—higher than the Bartletts. I find also that the Kieffer pears in one case were sold for 11s., and the Beurre d'Anjou for 15s. in Glasgow—both prices being higher than the Bartletts, I think the main reason of that being that they landed in better condition—perhaps a kind of pear that would not injure so quickly. Tomatoes realized 9s. 4d., realizing \$1.43 at Grimsby. Let me interject an explanation there, that these were small sized tomatoes. Now, that was the kind of tomato that was advised to be sent from all over Canada. The horticulturist at the Experimental Farm had issued a bulletin a year before advising medium and small-sized fruit to be sent, and in the same lot we sent some large-sized fruit.

Mr. BOULTER: What particular variety?

The SECRETARY: We shipped the Ignotum.

Prof. ROBERTSON: Large size fruit sold for 6s. 8d. netting 62c. against \$1.43 at Grimsby, and that occurred twice over, with the statement back from the consignees each

time, " Then grape nothing, b the grapes \$2.83 at C best prices confident, houses in fruit this can be sen learned th convention Canadian for all kin market pr First of a tender fru or from in factory wa from the o to the exte will help y danger fro must be ch peaches an safe stowag whole case than a larg more hardy package or peaches an enable one many cases thing more by itself. would pack packed mus fruit safe to ventilation. would carry you would atmosphere heat until y rapid decay amount of instance: much exper New York, with that f mere song, put in abou package for a very hand between the moderately shipments w The essentia

time, "Large sized tomatoes don't sell well in our market even in the best condition." Then grapes sold in London at 4s., netting 22c. down to 10c. and down to less than nothing, but the last shipment bringing back a better report from the retailers who got the grapes. We didn't send many plums altogether, but they sold at 15s. 6d., realizing \$2.83 at Grimsby. The apples we sold at 8s. 3d., realizing \$1.18. These are among the best prices that we got for the fruit that landed in reasonably good condition, but I am confident, from what I saw of the work this year on the steamships and at the warehouses in Montreal, and on the railway cars and back to the starting point, that the fruit this year didn't land in England in as good a condition as the same fruit can be sent next year, if we merely just carry out with fair judgment what we have learned this past year. Now, the next thing I find on my notes to bring before the convention is the matter of package itself. What is the best package in which to send Canadian fruit to Great Britain? Now, there is no best package that is equally suitable for all kinds of things, and no package will suit all markets equally well. There is a market preference as well as a fruit need in regard to the package that will be selected. First of all we want a package that will provide for the safe carriage, and in all the tender fruits the safety should be against attack from the inside rather than from bruising or from injury from the outside. The first shipments were conducted in a very unsatisfactory way in that sense. They were thoroughly protected against any possible injury from the outside, and that protected them from being cooled by the cold storage current to the extent that they decayed from the inside. I would like to make that clear so it will help you in any package you want to use, that the safe carriage is one protected from danger from the interior and not from the exterior of the package. Then the package must be cheap and suitable for any kind of handling, and for such things as tomatoes and peaches and grapes, the smaller the package the better, consistent at all with strength and safe stowage. Half cases sold every time for a good deal more than half the price of whole cases, because they gave much better satisfaction—a reasonably small case rather than a large case, such as one of these bushel ones, for everything except apples and the more hardy and firmer variety of pears. I think a package as small as the Burlington package or this other package is quite small enough for firm apples or pears, but for peaches and tomatoes, and grapes and plums these packages are abundantly large to enable one to get the best results. Then retailers don't care to buy a large package in many cases from the wholesale men in Covent Garden. I would rather, after saying one thing more in general terms, discuss the particular kind of package you want in each case by itself. Nobody would think of packing apples in the same kind of package that you would pack strawberries in. One thing more: The package in which tender fruits are packed must be provided with thorough ventilation. There is no possibility of carrying fruit safe to England, in large quantities, unless each package is provided with thorough ventilation. If you have a few packages—a dozen or twenty packages—perhaps you would carry those packages quite safely without each package being ventilated, because you would only have a certain little generation of heat which would be taken by the atmosphere; but if you have a great mass of packages, each one generates some little heat until you raise the heat of the whole mass 5, 10, 15 degrees, and then there will be rapid decay; so that there must not only be ventilation for each package, but a large amount of room for circulation around the packages on the ship. Take this as an instance: Lunnage, this last year, one of the firms in Covent Garden, who have not much experience in importing tender fruit, bought 5,000 packages of California pears in New York, in cold storage, said to be in the best of condition, and they packed the ship with that fruit quite full, and they had the misfortune of having to sell the fruit for a mere song, it being found in a rotten condition; whereas another more experienced shipper put in about 4,500 packages in a 6,000 package apartment and left a space around every package for the circulation of air, and he landed his fruit in splendid condition and made a very handsome profit. Now our first mistake on the ship was that we left only slats between the boxes, and the slat between the boxes, with the boxes at all filled with even moderately warm fruit, does not allow enough air to carry off the heat; and in our late shipments we left space between the boxes and the heat was cooled going on the voyage. The essential difficulty of a package like this (sample produced) in packing fruit as in

packing butter was in using a pine package, which is the most objectionable kind you can use as to material; it imparts a very offensive odor, and while the odor of pine is exceedingly agreeable in itself, when the odor of pine is mixed with the odor of any food product it becomes exceedingly offensive. Now a package that is built like this (McKinnon package) with a cover close on top and left that way will in half an hour become full of heat, say all around as low as that piece (half way down the side). The hot air won't go down and run up that way, and if you have cold air all around that, it will take a very long while for the cold air to be diffused through this warm air. If there be an opening at the top to enable it to rise it will cool the package very quickly. But the safety of that package, I should judge, is that you have just enough of a spread there at the top to let the warm air out, whereas in this package each specimen of fruit becomes a small slow drawing stove, the fruit being the fuel and the generation of heat going on; so that you may have a thermometer outside the package down to 38°—where it is held down at ship—and the thermometer inside the box is 68°.

Mr. McKINNON: May I ask if the fruit in the upper part of the cases was found to be more decayed than the fruit in the lower half of the cases?

Prof. ROBERTSON: In those I examined in Montreal, yes. From England I have no report, but some packages that landed in Montreal in a very warm condition we kept there and sold there. I had these opened, and counted the peaches out myself. I had these cases at one time in Montreal kept in a large cold storage room where the thermometer was 36° all the time, and with a 600 h.p. plant there was no trouble in having that cooling power, and after the fruit being there for forty-eight hours the fruit inside here I should say was something over 65°, whereas the ventilated package that would allow an escape of the air like that would get cooled down in less than twelve hours. We have so much of fragmentary information on this part of it that this I may say to you: not grudging the cost the department was at last year in this matter, we are going to have a cold storage building in Ottawa this summer just to find out these things, and we will know exactly, having it under our eye all the time so as to learn precisely how long it takes to cool certain packages, and the temperature at which the different kinds of fruit can be kept in the very best way. There is no way of knowing except doing it ourselves that way, and we are doing it in that way so that the public at large can profit from it. Meantime make sure of ventilation near the top where there is none, and let the hot air escape. What I have to say next in the way of suggestion, and also perhaps a text for somebody's remarks afterwards, is not on the package but on the packing. Now there is a wide difference between the two. You may have an excellent package and so pack fruit as to make the fruit spoil quickly. The packing includes first the handling. Now while I do, I know very little about the handling of tender fruits—at least I have this knowledge from my general knowledge of the causes of decaying substances, that it is far better to handle the tender fruit like the peach once than six times in packing, and it is much safer to handle the fruit when in cold condition than in a warm condition, even the one time, when you can manage it. So if in the handling of peaches they could be picked from the trees and then put in a cool place at once in baskets before any attempt was made to sort or pack them they would not suffer, whereas I could see marks of fingers showing where they were pulled or handled over, causing them to spoil at this place first. I think that is a matter that should be looked into as to whether it would not be better to have a place to put the fruit directly from the orchard, and leave it there for say twelve hours before any sorting or wrapping was done at all, and then it would be wrapped when cooled, and the fruit would be protected. Then in packing a good deal of care must be taken as to the temperature when the fruit is packed so as to keep the outside temperature from touching it. I say this by way of explanation and also by way of getting as much information as possible. If I put fruit in a case like this—thoroughly close and padded all round with excelsior or with peat moss, and each separate fruit wrapped in paper—and then put a tight cover on and have a tight box, if each separate fruit was quite cold when put in the ice, I could send that quite safely to England without cold storage at all; the cold fruit being insulated by the thickness of this box and the half-inch of excelsior lining of paper would keep the moisture from getting at the fruit. Now, if I pack that fruit in a box warm I do precisely the

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Prof be cooled would cos plan of c dian fruit I repeat t There is a from its p able kind Now, I th do its bes and there, what is to spread the gives a m then most to the stea preservati clearer tha of decay. ing germs, of trying t matter to cold storag one has to For want o have an ag agent will destroy fru changes th molds and form. No in paper w protection i to prevent dition that where the p rapidly in a form of rain Canadian fr they are fu should be s goes to Eng all fruits th

opposite. I keep the fruit from being warmed up in one case, and in the other case I keep the fruit from being cooled down. That brings me to say this next, that the packing should be so as to hold the fruit firm with as little packing material as can be used, and with an entire absence of all covering paper except the wrapper that goes around each single fruit. Every extra layer of paper you put around any kind of fruit keeps the cold air from getting at the case, and so far is a disadvantage. If any of you from what I have said will feel disposed to put up a cold storage building, I have brought a lot of very simple plans for building in the very best way and at the least possible cost, and a cold storage building can be erected at about this rate. If you will count the whole of the inside contents of the ice-house and cold storage room it would cost about ten cents a cubic foot for the full cost of material and insulation. If you want a big one it will cost you so much more.

The SECRETARY : This is for the whole space ?

Prof. ROBERTSON : That is where you cool by leaving the ice in position. If the room be cooled by taking the ice out and putting in galvanized iron cylinders, your ice house would cost you very much less. That brings me to say a few things about the general plan of cold storage and how it can be applied this year to keep very many other Canadian fruits along those lines I have spoken of. Its main use is by preserving the fruit. I repeat that,—to preserve the fruit, and not to give a man a chance to speculate in fruit. There is a great danger that the cold storage service of the Government may be diverted from its proper and intended use, so that people will buy all kinds of products of a perishable kind and put them in cold storage and hold them until they are out of their season. Now, I think only disaster can follow a course like that ; that every kind of product will do its best when marketed in its season. There may be a little amount of exception here and there, but every kind of product will do better in its own season, and make room for what is to follow after that. Then it gives a rather long marketing period ; you can spread the period out perhaps two weeks longer in the case of each fruit ; and then it gives a man a little better chance to choose his time of selling within those limits ; and then most of all it should be used to protect fruit while waiting shipment and on the way to the steamer. The latter is the main thing. Now, of all the different agents used for preservation let me mention just two things to make this cold storage matter perhaps clearer than it otherwise would be. In preserving anything like fruit there are two causes of decay. One of these is the attack on the outside of the fruit by all kinds of fermenting germs, and the other is the change in fruit itself—the change in its vitality. Instead of trying to reason at any length with you at all, we will be glad to send enough printed matter to make clear to any one who wants to read it, the theory and the principles of cold storage ; and let me make these two things clear—that in every change that occurs one has to take notice of two things : One is the agent and the other are the conditions. For want of clearness in these two things, cold storage methods are found defective. You have an agent that is active toward decay, and you have the conditions under which that agent will work well or will work badly. Now, you have, first of all in the agents that destroy fruit, the life of the fruit itself—the life in the cells of the fruit—bringing about changes that mean decay from the inside. Then you have changes from all kinds of molds and germs of these things that attack the fruit trees, often only in a very minute form. Now, packing in paper will protect from attacks from the outside, but wrapping in paper will never prevent the attacks that start from the inside. Therefore fruit needs protection by paper wrapping to protect it from one of these, and needs a cold condition to prevent other agents from doing their rapid work. Then I might note that one condition that makes for the rapid decay of all kinds of perishable products is the condition where the product is very wet, because all kinds of changes and fermentation go on more rapidly in a very moist product than a dry one. That is why grapes, when put in the form of raisins, will keep indefinitely. You dry the water off and they remain unchanged. Canadian fruits, such as pears and peaches, seem to be specially liable to decay because they are full of juice, more so than other fruits. It is needful that the temperature should be still lower for them than for other fruits of the same name. California fruit goes to England at a temperature of 40° to 48°, and this temperature they recommend for all fruits that go from California to Covent Garden. I think our Canadian peaches and

pears will stand probably two degrees lower with advantage, just because they are more liable to decay. I will not say what I thought once of saying on the matter of cold storage principles, but pass on to say a few words about the package itself for the cold storage building. There is no use of sending to Britain any small peaches, any small pears, or any small apples, and there is no use sending to Britain any large tomatoes. If you will bear this in mind in regard to these three things, you will get twice the price you would if you send the wrong thing large. Then, every packer should so pack his fruit that whatever the size will be or whatever the selection will be, it will be always the same. For, in Glasgow, and Liverpool and London, you will see men waiting around there in the auction room and holding their bids till the fruit of the packer they like goes up; and when that brand that three or four men all like goes up, the price goes up at the same time. If every packer could spend a week over there looking at the difference in price, there would not be a single packer that would not strive to have his packing of the best, and uniformly the best. It will pay every packer to put nearly one-third of his fruit, if need be, out into his—

MR. BURRELL: Pig pen?

PROF. ROBERTSON: Yes; pig pen or worse—put it wherever he can so that it will not go to anybody's table. If fruit had a higher fertilizing value than it has I would say it would be a valuable thing to make a compost of it; and that is not saying anything against the fruit growers, because any man who uses his eyes knows that you cannot have any large quantity of good things without a large quantity of poor things. Now it would be a good deal better to use them in any kind of way than to put them on the consumers' tables, and especially to use it in any kind of way that would not let them go to the consumers, especially in the same case with the best fruit. This year in apples one man's brand was wanted very actively at 30 and 35s. a barrel, while another man's brand was not wanted at 18s. a barrel. It is telling every year more and more, that the man who packs uniformly well, and has uniformly fine fruit, will have his brand set off and bid for until he gets a bigger price. That brings me to say a few words on the packing of soft apples in connection with this fruit. In all the soft and tender varieties of apples if they are packed warm and the barrels are closed up at once, and they are sent over to England in the usual way on the railway and on the ship, the experience has been about sixty per cent. returned back "wet and slack," and the feeling here has been rather of suspecting the Englishmen of fraud. Now if a soft kind of apple be packed in a barrel while it is warm and the barrel be closed up, the barrel will generate more heat, and the heat will cause the apples to occupy more space, and they will shrink and be wet. I am not going to argue that beyond telling you that this season 267 barrels of early apples were sent in cold storage in one of the best ships for cooling things down after they are put in the ship, and in the same week a shipment was made of the same stock of 325 barrels without cold storage and not being cooled down. The first parcel netted back in Western Ontario \$2.45 a barrel, and the other parcel averaged 75 cents a barrel—the same stock. The proportion of wets and slacks returned in the one case I think was about 200 barrels out of 325, and there was not a single barrel returned for wet or slack out of the 267 barrels that went to cold storage. Thereby hangs a very, very valuable piece of admonition in regard to the shipment of early apples—that if the apples are packed on a hot day then they should be put in the cellar for a day before the heads are put on, and then the heads or staves of the barrels should have holes that the heat may get out, and they ought to go in cold storage, and you would not get back more than three per cent. of slacks as against sixty per cent. of slacks that have been reported in past years. We have also learned a good deal about apple shipments; and before shipping the things at all I wrote every steamship company which was to carry apples a special letter urging them to have put in their ships for even fall and winter apples not a cold storage but an electric fan that would suck the warm air out and let the cool air down to the bottom of the apple hole. Two of them that have done that said they never had as much satisfaction in carrying apples before. (Hear, hear.) I believe with little things like that you could have the late fall and winter apples landed in England at bigger prices, and cause consumers to want three, four, and five times as many Canadian apples. I have sent some odd barrels myself to

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friends whom I have over there. The people all want Canadian apples when they get them fine, and when they get poor apples they simply give the country a bad name. Now the slacks that have come back reported in such large quantities have not been due to the packer's dishonesty, as the Englishman says, and they have not been due to the Englishman's trickery, as the packer says, but have been due to the conditions between these two men having been wrong and apples getting spoiled on the way. (Hear, hear.) I want to say also in regard to the sending of even later variety of apples in cold storage as against those that were sent in the ordinary holds of the ship. From one of those lots I have not yet the report, but from one lot that was sent from Grimbsy we have a report to this extent, that all the apples in cold storage were sound and firm, and most of the apples not in cold storage, while sound, on careful examination showed the beginnings of decay and of the spots in under the skin. While they sold well, a careful examination by an expert showed the beginnings of decay there, while the others were found sound and solid throughout. That means that we must have the cold storage for the early apples and ventilated chambers for all the rest of the apples. Then our apple trade will be on a good basis; but the shippers must ventilate the barrels and allow the warm air that generates in the barrel itself to escape both in the hold and before they go there. I have only a few things to say about pears in regard to packages. I think a package about this size (showing sample) is best for pears, and they should not be put in trays, but should be packed solid in the case wrapped in paper. The Californians use a case something like this, and then they put a cover on to keep the fruit solid and firm when moving, and then all the cases are packed on their edge in the ship, so that there is no possibility of squeezing the fruit by the pressure coming and crushing the sides, and then there are cleats nailed between each row, so that there is a circulation all around each row and between each layer. That means that it takes just about 5,000 cases to fill a 6,000 space in the hold, filled with the spaces all round, and by that means they could land the fruit in the best condition. I think a small package like this for Bartletts would be the best for us, with a centre piece, and then have the fruit packed in that way—(on the edge)—and have this side put on with a cleat. This small case is better for perishable fruit like Crawfords. The reason I advocate packing from the sides is because it is much easier to pack solid in a narrow space than you can pack in a large space. That will give you a better carrying package, and the same for nearly every kind of peach excepting the Crawford, and I think even the Crawford peach put in solid and cooled would carry best like that, with no trays at all between 2 and 2½ layers of peaches. The Glasgow people complain of those peaches being in layers—that the see-saw motion of the ship had bruised the surface of the peaches a little bit even when they were covered with paper; so I think we should try as far as possible to get small packages that would carry the fruit safely without any drawers or trays in between; and where one does use trays for such things as grapes, and perhaps even for tomatoes, those cheaper packages, let the trays be all wood and not of pasteboard. The last report I got two days ago complained that even in the cold weather the pasteboard trays, when the weather was quite cold, landed with the pears slightly molded from the paper becoming moldy in the damp; and every report I have had from England and Scotland this would be an eminently suitable package to carry the firmer kinds of peaches and tomatoes, and then that larger package for carrying apples and the firmer sorts of pears. These packages will cost very much less per case than ones that are filled with trays inside. In regard to pears, it is very important that the pears should be of a uniformly large size—a few small pears lessen the value very much; and then that the pears should be of uniform regular shape. Incorrect or misshaped fruit lessens the value very much. I have nothing more to say about peaches, and I would rather say what I have to say about tomatoes in any discussion that may take place; and I have only to apologize for the unconscionably long time taken in saying what I had to say; and if after I am through speaking any of you would like more direct definite information in regard to any part, I have got nearly all these letters by memory, and as well as I can I will give you the exact facts in regard to the Englishman's opinion of the fruits we have sent. Before I do that let me repeat what the Minister authorized me to say on his behalf here and on behalf of the Department

and Government: "That having gone as far as he has gone this year at the request of the Fruit Growers' Association and others to try and open up a trade in Great Britain for Canadian fine and tender fruits, that any further information that is needed in regard to packages and methods of packing and methods of transportation, and even methods of distribution in Britain, that can be gained by trial or experimental shipments—that information on all these lines that can be gained will be gained this year for the fruit growers by any reasonable amount of attention here and also in Great Britain. On the British side, what I think needs to be done further is, in addition to what I have said, to have a departmental agent at Covent Garden market in London and at the markets in Glasgow and Liverpool, when regular shipments are sent forward, who would inform fruit buyers, fruit salesmen and merchants, in say fifty surrounding places, by either telegram or telephone or post card a day before, that an auction of Canadian fruit was to be held at a certain hour, and thus try and bring in the additional competition of country buyers to that of the operators in the cities alone. We want to get our Canadian fruit back into the towns of England as well as into those great centres, and so we hope this year to do these things and profit as well as we can by the mistakes that we made and which we paid for rather too dearly, I fear, but by which we gained information which we could not have got in any other way than by experimental shipments on the fairly large scale which were made." (Applause.)

Mr. G. E. FISHER: I would like to ask the professor if, in building the box, he has any regard for the size between the thickness and the length? I consider that the length of the box should be some multiple of the thickness. For instance, this Burlington box, when turned up on its edge, which is the only proper way to ship, is just twice as long as it is wide.

Prof. ROBERTSON: The only objection to that one thing from experience is this, that on board steamships unless you have some thicker packages there is a very great degree of loss of space. Steamship space is about six feet high. If you are two inches short there is a good deal of space that is wasted that you have to pay for, whereas if you have thin packages as well as a package like that I think it would serve the purpose of getting the space filled up.

Mr. FISHER: But in arranging the length of your box in proportion to your thickness the length must be some multiple of the thickness in order to have it pack properly to assist the stowage, so that there will be no waste of space in stowing.

Prof. ROBERTSON: I don't know that I have ever given that any thought at all.

Mr. FISHER: In any package I have ever had anything to do with arranging the proportions of we have always given that matter consideration. We have it so that they will always pack both ways.

Prof. ROBERTSON: Take the California and the French fruit packages, there is not one geometrically proportioned as to length and thickness and width.

Mr. FISHER: I think they should be. There is another matter I would like to ask. I don't exactly understand what our relation is to the Government in securing cold storage accommodation on the vessels. If I understand you rightly, you said that all we have to do is to ask for it and we shall have it. Now, I ask for it now—(Laughter)—that the vessel people be instructed to give our shipments of perishable fruits space as long as they have space, without any regard to anybody else. We were told that we could not get space earlier than two days before the vessel sailed. Now, that practically did away with our securing space, because if we could not secure space earlier than two days before the vessel left we could not prepare the shipment and have it there in time.

Prof. ROBERTSON: The arrangements are like this—and then I will speak of what we may do this year. The steamship people in Montreal made a bargain for half of the space for people who were shippers outside of Montreal as long before as they like, but one-half of all the space of each steamship must be held for Montreal shippers, to give them their fair share, and that I suppose cannot be gotten till two days before, but the other half of the space may be bargained for as long before as the men will make the engagement. Then this is the same also with regard to the fruit, that the Government

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reserves space for two carloads on every ship, and if any shipper that is shipping fruit like that will notify the Department long enough beforehand that he will have the fruit, that space can be reserved for him, but he must fill the space. You see, if a man applies for space and says he will send a whole carload every week, we will provide it; but then he has to send the carload or pay for the space. This is the position now, that if the fruit growers will make up any sort of statement as to how much space they do want, and how much they will send every week, I am authorized to say that we will provide that space for them.

Mr. FISHER: Why not permit an application to the manager of the company in Montreal, asking for space for 500 cases to go by the "Numidian" on Saturday?

Prof. ROBERTSON: For this reason, that if he had already engaged space for butter he had no space left to dispose of.

Mr. FISHER: But have not we just as good a right to that space so long as there is that space?

Mr. WESLEY SMITH: "First come, first served," I suppose, is the rule.

Prof. ROBERTSON: No, this is the rule—and I suppose it can be amended if need be. There was no demand for cold storage space till this year except for butter. Now if there is going to be a demand for cold storage for fruit of any large dimensions, and we know what it is, we can have it provided for; but there never has been till now any demand. I can say I do not think any of those shipments—at least any of those that went from Burlington—would have gone at all if I had not taken the law into my own hands. There was no application for space. If there is an application put in now, or in the spring before navigation opens, space will be provided.

Mr. FISHER: I think we will make application now. I had a conversation with Mr. Robert Harling, manager of the Elder, Dempster Co., and he told me that the money of the fruit-growers was just as useful to them as the money of the dairymen, and they would just as soon carry our fruit as the butter, and all we had to do was to make the arrangement with the Government to do so; and it seems to me that the Government have not a very good reason for making a distinction between butter and fruit. All we ask is an equal privilege.

Prof. ROBERTSON: Let me say, in all seriousness, apart from all banter, that just as soon as the fruit men apply for this space and take it, the Minister says he will apply for the space for the fruit on the same terms as butter; but until now there has been no application for fruit except the trial shipments the Government sent. I did not have any application for space for fruit last season until some Montreal men spoke to me, and I went and had the United States butter hauled out of one hold and had the fruit put in instead.

Mr. FISHER: I am much obliged to you. (Laughter.)

Prof. ROBERTSON: If you apply for any space for fruit it will be provided. The Government of no country is as good as Providence—it does not usually give things until it is asked for them.

Mr. FISHER: I have just returned from Montreal and from going through some of those vessels, and although I thought I had a pretty competent attendant in the first officer of the ship, and that I gave the best attention, I failed to learn how they took the temperature of the cold storage apartments on the vessel.

Prof. ROBERTSON: In each chamber there is an opening in the deck, and down that is a two-inch pipe, thoroughly closed. That goes down two-thirds of the way into the hold, and the thermometer is put down in that pipe and is pulled up and read four times a day. The engineers have given me the reports taken four times a day like that.

Mr. McNEILL: I would like to ask what your opinion is between the relative merits of the two grapes for popular use, Canadian or foreign?

Mr. ROBERTSON: For my own eating, for just a few grapes, I like the French and the Spanish grapes better; but in the hot weather of summer, if I want to eat a large

number of grapes, as one often does, then, after the first half-dozen, I like the Canadian better. (Hear, hear.) In Liverpool I went to the fruit market one Saturday night and bought grapes at 2s. a pound, and bought nearly as good grapes—except out of condition and off the stems—for 4c. a pound; 50c. and 4c. were the two prices. One was a little out of condition and the other was perfect. So I think if we keep on pumping at the British public with grapes they will get to like them by-and-bye and eat a great many of them.

Mr. A. H. PETTIT: In regard to grapes, don't you believe if we had a system of cold blast, gathered by pipes leading up with a funnel-shaped mouth to the wind, that would force the air through a cold chamber and drive out the aroma and moisture from the grape compartment, that our grapes would carry better than in a cold storage compartment absolutely closed? Here we have some grapes to-day on the table kept firm in a cool cellar where they have had plenty of air and exposed, not in cold storage at all. Now I believe those grapes are in better condition than had they been in cold storage. We want the moisture and the aroma of the grape that would collect carried away by some process, and if the air was forced through by cold blast I believe they would go in better condition.

Prof. ROBERTSON: I think the grapes are like the fall apples—they don't require cold storage but require ventilation. The grapes that we landed in England were in capital condition except twenty boxes, so it was not the condition but it was the inherent flavor they complained of, and that would be improved slightly by the means you have suggested. Let me say this, that some of the first grapes were sent over, they thought, without being ripened enough, and I have got a good deal of information from I think the best authority on grapes in the world—a man who sells 50,000 barrels a year—and he says that every kind of grape meant for England should be ripened until it is dead ripe before it is taken from the vine; that while you may pluck pears and such other things that will ripen on the way, grapes do nothing but deteriorate after they leave the vine, and therefore all the grapes should be thoroughly ripened, and they will cling to the stem longer when thoroughly ripened than if picked too early.

Mr. WHYTE: What varieties were sent in those shipments?

Mr. M. PETTIT: What varieties of Canadian grapes, if any, did the Englishmen speak favorably of?

Prof. ROBERTSON: They did not speak favorably, in that sense, of any. The reports all came back that they were not the kind of grape they liked; but they sent over the Concords and Niagaras, then afterwards the Vergennes and a large number of mixed varieties. There were several different varieties of Rogers, some of the Brightons, and some of the Agawams, and they complained of those that were mixed and said that they ought not to have been mixed. There was no difference in the price between the kinds that are called the best varieties here, like the Brighton, Vergennes and Rogers, and the prices we got from the Concords and Niagara.

Mr. A. H. PETTIT: I notice that many of the Concords brought as good prices as many of the others. One word about the "sleeping" apple that you were speaking about. I imagine where they take the first nap is in the orchards of this country, where they are put in large piles on the warm ground in cool nights, and there left for weeks. There is where you get the sleepy apple for the British market.

Mr. BURRELL: I hope no Champion grapes were shipped to England; but I would like to bear out as an Englishman, who spent about twenty-five years in England, the truth of Prof. Robertson's remarks about grapes, and I hope we can overcome it. As a matter of fact all of us who come out here do what those people did in the hotel—we spit them out; but after a while we become accustomed to them and can eat from ten to twelve pounds a day. (Laughter.) I believe we could overcome that if we persevere. Personally I like the Spanish grapes, and they can be bought so cheap that we can never get so big a price for our grapes as we can for our peaches and pears. I would like to ask about the market of Manchester, because I have always been under the impression that it was one of the best markets in England for fruit.

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Prof. ROBERTSON : We had no opportunity of getting to Manchester because we had no cold storage ships going there. I offered to the Army and Navy store to get the grapes into the homes of the working people for next to nothing, but they would not take them even on those terms.

Mr. M. PETTIT : I think it will take us much longer to cultivate the taste of the Englishmen by sending Concord and Niagara than it would if we sent Delaware, Lindley, Agawam and Catawba. Those grapes, I am certain, would take in that market much more than the varieties which have been largely sent.

Prof. ROBERTSON : I think some of those were sent, except perhaps the Catawba, which I do not remember.

Mr. McNEILL : I take exception to that. We have here a different condition in the matter of grapes than we have in any other fruit. Any other fruit we can gather the Englishman has always been used to, only perhaps a little better than he ever got before ; but in this matter of grapes we are introducing an entirely new article. Our grapes differ entirely from the foreign grapes they have been used to, and consequently the problem is an entirely different one. Look at the conditions here in our own country. In the first place I maintain we have not the quality of Delaware ; we can never grow the quantity of Delaware that will ever make them a merchantable article in this country. The prices are not remunerative enough, and never will be, to grow them largely here ; but we have an unlimited country for Concords and grapes of that kind. We are growing them now in unlimited quantities, and we can increase the demand one hundred fold in the matter of Concord grapes ; and I maintain that the popular taste after all is for the Concord grape as against any other variety that is now grown. It is very true that, because there are not many Delawares grown because there is no great profit in growing them except in special cases, the price may be a little higher per pound, but the public demand the Concord grape and they get it, and they will eat twenty pounds of them where they eat one pound of any other variety. Now what we want to do is to put the Concord grape upon the English market, for we can grow quantities of it without limit. We have thousands of acres in Essex county that could be successfully devoted to the culture of Concord grapes. As far as grapes are concerned we simply want to force this new article on the British market. We call it grapes and it is grapes, of course, but it is an entirely new thing to put on the English market, and we ought to put it there upon its merits and take the same course with it as we took with our Canadian cheese, that is put it on year after year, and I have no doubt it will take the same course there as it has with ourselves and become the most popular grape on the market. It was my good fortune to have Thanksgiving dinner in Detroit, and the California grapes were there in a heap nicely rounded up. My contribution to the dinner was a couple of baskets of our ordinary grapes. Well, it was rather humorous to see the way they would nibble at a single berry of those luscious looking California white grapes that were exceedingly ornamental ; but just to see the way that the ordinary Canadian grape went was a caution. They would take one berry of the California grape, but they would take a whole bunch, and sometimes two or three, of the Canadian grapes—and they all went. (Hear, hear.) Now my experience of the English first-class table, I must confess, is somewhat limited, but I have had an opportunity of seeing something of a first-class English table, and what surprised me was the little grape scissors at the base of this pyramid of fruit that was there, and I didn't venture on anything till I saw one lady take a single berry, cut it off and eat it. I made bold afterwards to enquire just what were the habits of the English people with regard to eating grapes—I had been in the habit of eating from five to twelve pounds—(laughter)—and I was rather discouraged on this matter of having to take only a single berry. Well, my friend told me he was acquainted with the habits of the best English tables, and he said that any man that would take more than three berries would be considered a hog. (Laughter.)

Mr. BURRELL : But it was a hoggish price ; it was about 15s. a pound those grapes were. (Laughter.)

Mr. McNEILL : What we want is to put this Concord grape on the English market on its merits, force it on that market ; we can do it, and there is not the slightest doubt

that it will follow the same course that the banana has in our own country, where it used to be sold in small quantities and is now sold in enormously large quantities.

Mr. WHYTE: The reason that Concord grapes sell in large quantities is because it is cheap. (Hear, hear.) In Ottawa this season you could buy any quantity of Concord grapes, ten pound baskets, basket and all, for fifteen cents. At the same time you would pay twenty-five cents and thirty-five cents for Delawares, and Wilder thirty-five cents. Now, if you could grow those others at the same price as ConCORDS there would be a great deal of money.

Mr. McNEILL: I would rather grow a Concord at one and a half cents than I would grow a Delaware at five cents.

Mr. WHYTE: When grapes go to England they don't want them because they are cheap, they want them because they are good, and they would a good deal rather pay twice as much for the Wilder than they would for the Concord. I always think it is a mistake to send the Concord or the Niagara to the old country. We want to send the very best we have, because the freight is a very large part of the cost of laying them down there, and the freight is just as large on a fifteen cent basket of Concord as it is on a fifteen cent basket of Wilder.

Prof. FLETCHER: I have been carrying on experiments for a good many years bearing right on this subject. Being an Englishman, and having come here a good many years ago, and having what I think is the characteristic dislike of the Englishman for the Canadian grape when they first come, I was surprised in about two or three years that I gradually got to like the Canadian grapes a good deal better than either the Spanish or the California grapes—(hear, hear)—and as a matter of curiosity, whenever I caught a raw, uneducated Englishman, I turned him loose on some of our Canadian grapes; and as bearing on the varieties that are likely to be of use to Englishmen I will tell you the fruit that has taken their best fancy. First of all the Delaware, that is something like the Sweetwater in taste, so they are educated a little to like it. Then comes the Brighton every time, and after that the Lindley, and they think that is something like a rather large Delaware—they don't discriminate very much. As to what Mr. McNeill says about giving it to them as something else than a grape, if you would call that Indian Snow-berry or Indian Red-berry they would investigate it as something that they wanted to know about; but I cannot help thinking it would be a long time before ever they got used to ConCORDS, because that is about the strongest, and if you could teach them to call that strong flavor "musky" instead of "foxy" they will get accustomed to it sooner. Another of my experiments that is amusing is to give an Englishman a Concord or Niagara grape, but before giving it to him I say, "Come and have some of our Canadian Muscats," and they will taste them and say, "They are not as good as the Muscats of Alexandria, but they are nice." Then they take the other and they say, "Yes, they're nice, but they are very much like the other Canadian grapes." (Laughter.)

Mr. BOULTER: I would like to ask if there has been many grapes shipped to the old country before this year, 1897?

Prof. ROBERTSON: I am not aware of many going commercially. I know some have gone to the exhibition. This year we sent over 2,700 cases.

Mr. BOULTER: In sending goods to the British market we should remember the Englishman's taste. There is no use of us arguing from the point as to what is the best thing for the Canadian palate. I agree with Prof. Robertson that although prices have not yielded satisfactorily it would be in the interests of the fruit growers of Canada to continue on sending and trying to educate the Englishman to eat our grapes. In my experience as a canner of fruit and vegetables we find the Englishman will not eat corn. They have got so that they will eat tomatoes. I have been advocating that we should send over corn and force it down that Englishman's throat in some way. (Laughter.) And we did it; I sent them a full car of corn and I told my agents in London, "Put it in the eating houses, put it before them. Find out if you can't make them eat it. Send them recipes of how it should be cooked, and in every shape and manner induce them to learn to eat it," because as soon as you get an Englishman here, like Prof. Fletcher,—he

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is honest enough to own it—you can't fill him up, he is hollow to the boots—(laughter)—but the trouble is, he will not eat it unless it is forced on him in his own country. And my theory is to keep right at it, keep sending them grapes. But do not go home with the idea that you know more than those who are over there in trying to make this a success. I think yet exporting fruit will be a success. Now the fruit-growers have a good a right to have patronage bestowed on them as the butter men have. The California people studied the interests of the people they were selling to, and put up their fruit in packages and got good prices. I was talking to one of the best fruit men in Winnipeg, and I said, "I am sorry you get all Kansas apples." "Well," he said, "we don't get the Canadian apples as we want to get them." That is a trade that has never been spoken of at any of our meetings, and I think if more attention was paid to the Winnipeg market good results would come to us as fruit growers. We should try to follow out these directions that we have heard.

Prof. ROBERTSON: Prof. Saunders a good many years ago was a pioneer in this work of shipping some grapes to England in connection with the Indian and Colonial Exhibition, and perhaps some experience gained then would be valuable at this point.

Prof. SAUNDERS: I might give an item or two of that experience, as I think it is appropriate at the present time; and anyone who has undertaken to make an Englishman eat what he doesn't want has undertaken a large contract, and is raising opposition in the mind of such party that is not easily got over. I think the best way in which to coax along this grape trade is to try and send them those varieties of grapes which are most nearly what the Englishmen want, and those varieties which Mr. Pettit has referred to here and which Mr. Whyte has referred to, where there is an absence to a greater or less extent of that characteristic which is sometimes designated as "musky" and sometimes "foxy," which is got from the wild fox grape blood of this country in the grapes. At the time of the Indian and Colonial Exhibition I had charge of the fruit exhibit, and in arranging in the spring the large pyramid of preserved fruits I came home here and with the aid of some of the most active members of this association, who most cordially went into the work, we succeeded in getting together a very large exhibit of fresh fruit, and among the rest sent over a large number of varieties of grapes. Now those grapes were exhibited under the auspices of the Royal Agricultural Society, and the very best judges that they could find appointed to examine and report on those grapes, and they would not have anything to do with any such grape as Niagara, but said, "Those are not the kind of grapes that we have been in the habit of using;" they didn't like the flavor of them; they had not been educated, as Mr. Burrell has remarked, and this process of education is a little difficult when a man is not a willing subject. They were not willing subjects. While they reported favorably of such grapes as the Delaware and others of that character, and most favorably of all on one of the small white grapes which was exhibited, which had no musky or foxy flavor in it at all, they said "that is the kind of grape we want in England," and I think it is much better to proceed cautiously in this matter and not overload the British market with grapes that they don't want, but try and work our Canadian grapes in first by sending them those varieties that most nearly approach to what the Englishman regards as a good grape. Then, after that, we may work in these Concords and other grapes possibly to better advantage. I think this discussion will be productive of a great deal of good. It is well that we all have an opportunity to ventilate our own ideas in this matter, but at the same time we should understand that in all our food supplies that we have been sending to England and all that we hope to send, as far as success has attended that effort, the greatest success has followed the endeavor to meet the tastes and prejudices—if you may call them so—of the party we are endeavoring to supply, by providing not only the right sort of fruit but putting it up in the right sort of packages and just in the way which purchasers want. If we can capture the market in any way, by guile or any other method, it is all lawful in trade, and we should try every means in our power I think to meet the prejudices of our customers so as to please them and try and cultivate as large a trade as we possibly can. It is the Englishman's money we are after, and the more of that we get the better we shall feel, and he has no objection to that provided he gets the thing he wants. (Applause.)

Mr. RACE: Before this discussion closes I would like to have some definite expression of opinion of that one point that Mr. Pettit brought up, about piling apples up under the trees before being barrelled. That is a custom that is very generally followed by the apple buyers, who have a habit of referring to all members of this association as "experts," and laughing at their so called theories. I have come into conflict on several occasions with these apple buyers on that very point. I know from my experience that the apple is cooler when it is hanging on the tree attached by its own stem. If I put a few barrels in the cellar for winter, which I always do, I like the apples picked from the trees and put into the barrel and then into the cellar; I believe it is cooler; but the apple buyers laugh at that idea; they say it is necessary that the apples should be picked and allowed to lay in heaps before being barreled. If that is a wrong idea this error should be remedied, and a strong expression from such men as Prof. Robertson and other men of this Association to that effect would probably have some effect on these apple buyers. If they are pursuing a wrong process, and thus injuring the apple exportation trade, I think that it should be remedied by notifying them of it.

Mr. BURRELL: Was not Mr. Pettit referring to the early apples and the warm weather?

Mr. A. H. PETTIT: No, I was referring to the fall apples. Apples have been put in piles, and they become mellow and ripe without any crispness about them. I have refused on one or two occasions to pack apples or buy apples if they had been piled for any length of time, because they have been mellow and lose their crispness. There was not two days elapsed between the picking and the shipping of my apples at any time this season, and I venture to say I hadn't three barrels out of 100 slack, wet or waste in the whole lot. It shows if they are picked properly and lightly they had time on the voyage to do what sweating was necessary; but you pile them under the trees in the orchards with the cool air of the night over them and the warm ground underneath and the sun coming out the next day, and in one week your apples have no crispness left—they are simply mellow and you can never bring back to them that life again. They are what you call a sleepy apple.

Prof. ROBERTSON: I frankly confess that I have no information to offer on that topic as to the effect of treating apples in the two different ways; but if any of you are shipping early fall apples in cold storage be sure you send instructions to the consignee to leave them two days on the other side after they come out before they are opened. If they come out of the cold storage very cold into the atmosphere of England they will sweat—meaning that there is a condensation from the air on them; and I find that complaint the same as the egg men complain of the egg sweating. Eggs left two days after coming out of the cold storage are perfectly dry.

Mr. E. D. SMITH (Winona): How long will our fruit keep after it is taken out of cold storage, supposing it arrive in the best condition? The remark was made that it would sell better if kept six days than three days. I presume our peaches would not keep three days. How do our fruits compare with the California fruits in the length of time they will keep after being taken out of cold storage?

Prof. ROBERTSON: We have no definite data, because our experimental work this year was to find these things out. I think California fruit will keep twice as long as the Canadian fruit, because it has a tougher flesh. California peaches and pears will keep longer. There is a notion that fruit that is in cold storage will spoil quicker when taken out. If the cold storage be steady, and anything from 38 degrees downwards, I think the fruit does not gain one day in fourteen in ripening; so if the fruit would keep six days when it is put up here it would keep five days after it landed there. I think some of our fruit, except ripening peaches, would keep for eight days over there.

Mr. McKINNON: I made a rough analysis of my account sales, and I think I may say, speaking roughly, that the Rogers grapes brought double the price of Niagaras; that the Niagaras and Rogers assorted, half and half of each in the same tray, brought very little more than pure Niagaras; and this other fact struck me, because it surprised me very much, that the Worden grape, which I shipped purely as an experiment, not expecting it

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to carry well at all because it is so tender of skin, brought amongst the best prices—I think brought a far better price than either Concord or Niagara. That goes to show that the Englishmen, knowing nothing about the comparative cost of growing either the Concord or the Rogers, very much prefer the Rogers variety of grapes. Another thing I noticed was that the Black Rogers didn't bring so good a price as the red Rogers; that also surprised me.

Mr. BURRELL: I would like to ask one question on that sphagnum or peat moss, whether you find it expensive.

Prof. ROBERTSON: Trial shipments have been sent from Toronto in three different lots, and the reports have all come back that the fruit landed in first-rate condition, but it would not pay at all to ship anything like peaches in a case like that, or the softest kinds of pears in sphagnum without cold storage. If a large shipment was sent without cold storage there would be a heavy loss. Sphagnum has sold in Ottawa I think at about \$11 a ton, and I think it can be procured less than that.

Mr. BURRELL: Is it in the form of moss or powder?

Prof. ROBERTSON: Powder form. It rather blackens the fruit when it gets on the paper.

Mr. A. M. SMITH: Is there any bad flavor absorbed from it?

Prof. ROBERTSON: No; it is a very great absorbent.

Mr. BURRELL: I understood it would absorb the moisture and help to keep the fruit in that way.

ADDRESS BY MAYOR SNYDER.

I am here on behalf of the citizens of this town, and the town council especially, to extend to you a hearty welcome. We all know the benefits we have derived from your association in the past by your practical tests of the different classes and varieties of fruits, and by investigating the different diseases and insect pests which fruit trees are liable to, and by considering remedies therefor and publishing them in detail throughout this country, and also by giving the people information with regard to shipping and marketing both at home and abroad. By inviting you here we expect to derive some of this information from the discussions. We have nothing special as a town to attract you, especially at this time of year. We have a number of manufacturing industries here which will compare favorably with any town in the country in proportion to population, which is about 3,000. We hope that your meetings will be well attended, especially by the farmers of this section, and that they will benefit greatly by what they hear.

THE PRESIDENT: On behalf of the Fruit Growers' Association I have to thank you and your town's people for the hearty welcome you have given us. It is especially pleasing to us all to see the ladies here to-night. (Applause.) Where they are interested we all know that the cause is good. (Hear, hear.) We have no doubt that we will be pleased with the meeting in this place. Our welcome has been hearty in every way, and the number of persons here to-night, representing as you do the town of Waterloo, shows us the deep interest that is taken in our society. I have been much struck with the general prosperity of your town, as evidenced by the fine dwellings and prosperous factories. You have, however, also a Dominion reputation as a prosperous town—(hear, hear and applause)—and for that reason I am satisfied that although in the town your interests are more centered in manufactures, still there are evidences that you are interested in fruit culture and horticulture. I am proud to say you have one of the largest local horticultural societies in the Dominion. You have given us support in that way, and when we received your invitation to come here we felt that we could not do less than show our appreciation of your interest in horticulture by accepting it and giving you the benefit of any experience we might have. I believe that this Association is one of interest

to the whole Dominion. Fruit growing is one of the largest industries now in Canada, and we have arrived at a period when we are able to supply not only the local demands, but the supply of fruit is such that we have been forced to look for outside markets. This shows that fruit growing is prosperous, and I am satisfied we will be able to find a market for all our surplus fruit. I am proud to say that fruit growers as a body are one of the most intelligent, progressive and industrious class of people in this commercial Dominion of Canada; and we are going to show the people of the Dominion that although it looked as if we might have a surplus in fruit growing, still we shall be able to find markets for all the fruit that we are able to grow. I think Canada is particularly well situated for the growing of fruit. It is natural to the climate, which enables us to raise the very best specimens of fruit. We have also to thank both the Dominion and Local Governments for the interest they have taken in this important industry. By their aid we have made experiments which at the meetings here have been fully brought out, and which will show the people who are interested in fruit that this industry is not going to go behind that of any in the country. (Hear, hear.) Again I thank you on behalf of the Association.

THE FOOD AND THE MAN.

BY PROF. ROBERTSON, DOMINION AGRICULTURAL COMMISSIONER, OTTAWA.

I must congratulate you on the excellent annual address, and this Association upon the most useful educational work it is doing in the Province of Ontario. Some people, who live on farms particularly, have a notion that everything educational is wholly concerned with words—the names of things, language, literature; but I think education is hardly worth the name that does not somehow help a man and a woman, a boy and a girl, to do the things of their ordinary life rather better than they would otherwise be able to do them; and so this Association is doing excellent educational work in helping the people who live on land to make that land produce more, and more beautiful and better things, for those of us who are so unfortunate as to be compelled to live in towns. I bear to this meeting the message of the Minister of Agriculture, who asked me to say that he was extremely sorry that public duties detained him at Ottawa, and made it impossible for him to be here to meet this Association, and to say to the people themselves how much he was interested in the work of the Association and in the educational campaign it was carrying on all over this Province of Ontario. He belongs to Quebec, and notwithstanding the fact that he is a citizen of that Province he still has a very wholesome respect for people in Ontario—(laughter)—and that is rather more than some people in Ontario have for people who live in Quebec, who are quite as good as they are. (Hear, hear, and laughter). Now, sir, I must address myself to the subject that I thought I would say a little about to-night, and that is the food values of fruit for people in Canada. Half the struggle of life is a struggle for food. Of course, you say, that is quite true of savage people and of animals that fight for their share, but it is equally true of the most highly civilized communities, who also fight for their share, and if they fight in a more polite way, with more polished weapons, it is not any the less merciless in these latter days, and to earn a man's bread and butter and his apple sauce nowadays is just as hard as it was in the long ago, when he had to take his part in the war and to go out and fight for what he got. I think, sometimes, the wounds of swords and spears were easier healed than the wounds people get in industrial and other competitions. They struck the body only, and left the soul unscathed; nowadays it is sometimes hard to keep a man's heart and soul his own that is striving to get bread honestly in the stern and severe and merciless competition of these latter days. Anything that will help the people to get better food easier would be a great boon to the people, and it is not want in Canada of good food that makes it hard to make ends meet, but it is the utter waste of food and getting the wrong thing at the wrong time. Now, the struggle for food seems to be a sordid subject; but in Waterloo, I will warrant that more than 50c. of

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every dollar that the artisans earn goes for food. And whatever half of all a man earns costs is to him an object of serious concern. If he could save 10c. on this 50c. and still live better, he would have 10c. for fun—and that is worth a lot. (Laughter.) There is nothing in life worth living for except fun. (Laughter.) To put in the largest application, that means if a man can make real fun for other fellows and himself he is putting God's sunshine into humanity in the best way. (Applause.) Now, the kind of food and the way food is used have a very strong and far-reaching influence on health, and I do not know how many of people's confessed shortcomings are due to moral delinquencies or due to bad digestion. I think there is nothing that makes the world look so bad and so blue, and gives so much apparent cause for the doctrine of the total depravity of the human heart, as the derangement of the human stomach. Man's body means a lot; and I myself have a little personal confession—I never look out on life without a great deal of hopefulness that it was evening and the morning of the first day. It is always so—not the morning and the evening, but the evening and the morning to come, always the first way, unless my digestion is bad or liver is wrong, then it is the morning and the evening, and the darkness is coming. (Laughter.) And more fruit and less flesh would make people have a better view of life. More fruit food and less meat food would make people look out on life with kindlier eyes than they do now. The strength we have for endurance and achievement comes for food. Man is given power to move muscles. He has no power to move any part of his body except as the energy somehow came from food, and even the kind of energy and the way he can use it is in some measure circumscribed and limited to the kind of food he gets. Then personal efficiency for service, their enjoyment, somehow, depends on food; and if a man was all the while compelled to eat hideous things that looked ugly I rather think he would have hideous thoughts about lots of things and act ugly. You would not believe the effect on the kindness of behaviour of a boy of having the surrounding of the boy beautiful and pleasant for the boy. If the good Lord had made the earth an ugly place, with trees inverted so that the roots and the earth were on top and scattering on us all the time, you would have a world not only full of savages, but murderous savages all the time. Refinement is one of the greatest things in the world to make man kindly, thoughtful and appreciative, and so God made things beautiful that are fit to eat. Then, let us make enquiry what is man's body? I am rather afraid I might go contrary to some announcements of this afternoon. One of them said an Englishman's body was a great hollow place that was a cavity from the mouth down to the shoes for holding things. (Laughter.) The body is composed of substances, and is such a house for a man that a man's behaviour is somehow affected by the kind of house he lives in. You don't describe a man when you describe his house any more than you describe a man when you describe his body. Somehow the body a man has with him affects himself a great deal. Now, what I have to speak of to night is mainly man's body, and some influences it may have on the man himself; so do not mistake what I say as having the same effect on the whole man, though they have a very decided effect on the whole man. A man's body is composed of five different compounds as shown on this chart. There is 60 per cent. of water in a man's body—occasionally you might find on close analysis, perhaps, a little beer or Scotch whiskey. (Laughter.) That would not be at all to the advantage of a man's body, because water is the vehicle in the body for carrying things about inside; so that when a man has a piece of skin knocked off his hand he does not need to stick a piece of plaster on, but goes on eating things which contain the very essential things that that skin was made of, and the water carries the particles around and the life builds that part over, and there is no vehicle in the body for carrying things around like water, and anything else that you put in with water except solids that go to make nourishment interferes with the carrying power of that vehicle. That applies to the whole range of human nutrition as far as I know. In a man's body you have about one-sixth of albuminoids, such as the white of eggs, and when a man consumes eggs, the whites of the eggs becomes the albuminoids of his body, that is, the substance in his food becomes transformed in his body to repair the waste that goes on all the time; you have it in the curd of milk, and perhaps, the albuminoids of the body are not nourished in any better way than by the albuminoids of milk. Then you have it in the gluten of wheat. If you chew some raw wheat the little cud

that is left, after you have sucked the starch out, is the gluten of wheat, the same in chemical composition as the albumen of milk or the curd of milk or the fibrine of beef—the lean part of beef. And then you have in the human body some fats—15 per cent. of fats. That varies a great deal. The fat is the fuel, the lubricant stored up to make the motions of the body easy, to oil the joints; and then as a fuel it is like a tender on the engine—it is a store of fuel to be called on at any time it can be burned up to furnish force for any kind of big undertaking. That is why one always delights to see one fat, because one always knows a fat man can do a great deal if he feels inclined to try it. (Laughter.) The carbohydrates, which are the fuels, composing 5 per cent. of the body, are the starches and sugars and gums that are taken in as food, just as wood is burned up in a stove; and you have mineral matter, 8 per cent. that is lime, that is the main constituent of milk, that is why skimmed milk often is the best thing you can give to growing bones. Nothing in the whole economy will give such toughness of bone, fine quality, as a great amount of milk. The opinion nowadays that milk is not the best thing to have in the house is getting prevalent in some quarters, which I think is very unfortunate. I had some pigs put into different groups—from the very same family, so that the families were the same, the brood was the same, the inheritance was the same—and some of those pigs fed on grain alone with no milk from the time they were weaned. Other pigs were fed a liberal allowance of skimmed milk with a little grain, and after the pigs had been grown up, fattened and killed, the bones were taken out and put under the test of a lever, and weights were hung on to see when they would break, and the bones would go snap with about 80 lbs. pressure when the pigs had no milk, and when the pigs had milk they didn't look any bigger, but they had that toughness that they would never go snap. You don't know when the strain comes on a boy's mind or conscience, and his body goes snap from weak bones, which is a very bad thing for a boy. You cannot grow boys' bones twice, boys' bones are grown only once. It is worth a lot of information to have boys whose bones are well grown, for all kinds of faithfulness, both for patient continuance in what they believe to be right and achieving things without any consciousness or seeking of self-ease. There is nothing at all for that that is equal to milk. That is why the first foster-mother, the milk cow, is very valuable in giving to the nations faithfulness. Milk is valuable in giving elements that those other things don't furnish at all. That brings me to speaking of things that are wholesome and requisite. The boy's definition of wholesome food is, "Wholesome things are things that are tasteless and nasty." There is no reason why things that are particularly wholesome should not be quite as beautiful and quite as nice as the things that are perhaps not quite as wholesome. On this chart I have shown you the source of some of these things that we call albuminoids and carbohydrates of fats for foods, to show you they came from the same things that those apples and pears and grapes come from. Albuminoids are composed of things in the atmosphere and water—nitrogen and the carbon and the oxygen and the hydrogen. When a man grows a field of grain or an apple tree or a grape-vine thereby he gleans from things that were useless and makes them valuable. That is creating wealth. If a man goes to the Klondyke or some other place, and claims, and brings back gold, he acquires some wealth for himself and community, but he does not enrich the community any more than the man who does these other things by making wealth in useful forms; and so the real wealth of this country after all will always come from the labor of those men who make the most out of the natural resources through the production of food of all kinds. This is merely to illustrate that point of albuminoids, that many human foods come from those sources as well—atmosphere, sunshine, water—and you have from an acre of Indian corn 873 lbs; that is a pretty large amount of albuminoids—enough to keep a man well nourished for nine years. An acre of Indian corn would serve a man for that period if he could digest corn stalks, leaves and all the rest of it. Now he need not tackle that task unless he is a man who has forgotten his manhood. He might buy a cow, or grow a cow, and make the cow do the work she is adapted for of turning corn-stalks into cream, and he might drink the cream at the other end. There are lots of men go on eating corn stalks instead all through their life. They are unjust to the cow, that is all I can say. As to these other things I will not spend any time further than to say that you have food from these

sources, and forms, the gotten in their econ basket. (these foods the inert a and the inc sunshine b the soil, bu all time; b latent, then crush it. (Laughter.) getting a li it can awa delicate inf down roots been playin influence. on the hort the fruit gr it can have and do for of the suns enthusias individual, from its beg the things to you say that the apple ble will believe lifting up an come by-and into the sun In the sunsh the fruit gro that sunshin apple, more the minds of not nourish. make the fo certain prop hydrates, an people who forming and according to of the flesh-f not contain the fat is i wheat bread it up for the creamery but business that much the bet and was help know butter

sources, and they go to make human bodies. They can be gotten in the daintiest of forms, the most delicious of forms, perhaps most elevated forms, in fruit. They can be gotten in the cheapest of forms in the cereals. That is why the Scotch people from their economical habits prefer oatmeal at 2½ cents a pound to peaches at 80 cents a basket. (Laughter.) I will show you from the next chart the comparative value of these foods—cereals, animals and others. Before I pass I would like to observe that the inert atmosphere—in a sense inert although moving—and the inert substance in soil and the inert seed, which stays unchanged, when put together, under the influence of sunshine begin to do things. You put the apple seed that looks dry and unsightly into the soil, bury it and leave it without sunshine, and it will rot, that becomes its grave for all time; but if you put the apple seed in the soil, the apple seed having vitality that is latent, then the sunshine will waken it up in the most gentle way. A man's heel would crush it. Lots of people try to awaken things up in that way, and it does not do. (Laughter.) But though sunshine is so powerful that if you could conceive of the earth getting a little nearer, just sizzling the whole globe in about two jiffies, it is so gentle that it can awaken the apple seed without hurting it. A man cannot think of the most delicate infant awakening more gently. And then it goes on and does things, and sends down roots and sends up shoots, and then it becomes a tree, because this sunshine has been playing on the inert material and making it active—making it do things under its influence. Now, it is no stretch of simile to say that this Association is trying to do that on the horticultural life of Ontario. I don't think it may hope to load information on the fruit growers any more than you would load fertilizers around the apple seed, but if it can have a kindly influence in the way of awakening the men up to seek for themselves and do for themselves, these men will do more because of that kindly influence which is of the sunshine sort. That is the value of an association, and the information and enthusiasm which its conventions can give rise to. Then the sun comes back to the individual, no matter what food he eats; but if you will think that out to its conclusion from its beginnings you will see that the glorious blossoms on the apple tree—considering the things to come from the filthy manure of the barnyards—came that way; and while you say that it is a sordid and common-place kind of life, to go fertilizing an orchard, yet the apple blossoms are the simile and symbol of the highest of romance, and the boy who will believe in sunshine for other people has a romantic life always, an ideal life—a life lifting up and reaching up and going out, a beautiful life in itself as well as the useful to come by-and-bye; and any life that is not like that is hardly worth the living. To go into the sunshine business, and stay in it for a life-time is the meaning of being on earth. In the sunshine business—that is the farmer's task, to grow food from sunshine; it is the fruit grower's task, and in the larger sense it is a man and woman's task to make that sunshine which would otherwise go dissipated, useful if it passes through the apple, more valuable if passed through the man, a thousand fold more valuable on the minds of the other men for the nobler and larger life that even the apple will not nourish. Then speaking for a moment on those classes of food like cereals, to make the food nourishing in its best way, it has to be balanced so as to contain certain proportions of certain things, and the albuminoids and the fats and the carbohydrates, and there is like a standard food in these proportions. By long experiment people who live best eat food balanced in that way—a certain proportion of the flesh-forming and the heat-producing; and oatmeal is actually scientifically a balanced food according to the practice of the best people, it contains about the correct proportions of the flesh-forming and heat-producing. Then wheat is almost as good, but it does not contain quite enough fat, and bread contains still less fat because a large part of the fat is in the bran which is taken off in the grinding. That is why, to make wheat bread a good food, it needs to have a good deal of butter put on it to balance it up for the sake of wholesomeness, and butter is always good; if you can take creamery butter in the winter time so much the better, it will help our creamery business that is needing your support. If it will cost twenty-five cents a pound so much the better. You remember the story of the man who just started housekeeping and was helping himself liberally to the butter when his wife said, "John, don't you know butter costs twenty-five cents a pound?" and he replied, "Yes, I do, my dear,

and it is worth it, and more too." (Laughter.) It would take too long to go over the lists of these foods. Animal food contains a much larger proportion of the flesh-forming part, so that beef would be a very poor kind of food, an ill-balanced food, unless it was mixed with potatoes, which again are very deficient in the flesh-forming parts, the two forming a well-balanced food together. Then if you have very fat pork it is deficient in the flesh-forming part, so you should have beans, which you see contain a very large proportion of albuminoids. You would never think of anyone liking beans and lean roast beef, but you would find people liking pork and beans, and if you take even those common dishes you will find they are well-balanced foods, only some of them are rather unwholesome, and some of them are rather more unwholesome than others; but the common sense of the people in that way has been merely causing them to do what scientific investigation now merely explains. Then if you take a fish like salmon, a very rich food, and have that with rice, you will find it the food of the Japanese, which makes a very well balanced food, about the very same as potatoes and beef, or about the same as pork and beans. I need not pursue that at all by trying to show you that the value of foods in some measure, or the kinds of food, affect the quality of the people. This rather lends itself to a good deal, at least of suggestive study, to see how certain foods affect the people who have lived largely on them. You have rice, the typical dish of the Chinese, a dainty and delicate and rather forceless kind of food, and a forceless kind of people; and if you find people living on fried food and fat pork, you will find the Chinese disposition in regard to a great many things, because the bodies are not nourished, and the nerves and the parts that need to be nourished to make people forceful and self-controlled and masterful.

Then I come to this last chart, and the composition of foods in the whole of fruit, and I have not much to say about them so far as the nourishment they contain is concerned. They are not very nourishing per pound, but they have some effect on the whole system that soothes and pleases and enables the body to make better use of things that are swallowed. Apples contain a very small percentage of the albuminoids and fats, and a good deal of the carbo-hydrates, and the rest is water. Oranges about the same, a great deal of water. Prunes, apricots, figs, grapes, it is not quite so wonderful that some gentlemen are rather quietly boasting to day that they could nicely put away from five to eight pounds of grapes per day—(laughter)—it was not so very marvellous after all, you see, because if one in the hot weather is exceedingly thirsty, you have so very much water in grapes that it is simply a question of drinking your water in that form and taking it in smaller mouthfuls at that, because the amount of nourishment in the grape is not so very large. There is, however, a very fair amount of nourishment in the most comforting and stimulating form; and I want to say in this connection, which I didn't mention this afternoon, that the market for grapes is very limited in this country, and an effort is being made to acquire a foothold in the market and create a demand there; but I think it would pay the grape growers to cultivate very studiously and very carefully a consumptive demand for the juice of the grape. I am not in for making Canada a wine-making country, not saying a word either in favor of plebiscite or the prohibition party or the other party; but this I think at any rate is to be known by anyone who has thought out the conditions of life here, that Canada can never be a wine-making country, and never can exist as a wine drinking country. Whatever other peoples may be able to do, a people who live in a climate like ours and whose social and other conditions are like ours, cannot afford to drink wines in any ordinary quantities like they do in the Old Country at all. If you will watch the men who drink wine here and watch the same who drink in England you will find a teetotal difference in the effect on them, their conditions, that are not perhaps unreasonable altogether. Certainly this will not be a wine-drinking country for fermented wines; but I do not find any kind of drink, except milk, so comforting and nourishing when one is working to the edge of his strength sometimes as grape juice unfermented and mixed with any sort of aerated water you like, and some of us in Ottawa have been trying to develop a taste for that, and people who get it once say it is the best drink they can get, and they like it better than anything else they get, only the Canadian make, so far as I have seen samples, does not compare with the United States' make yet for the concentrated grape juice, which is exceedingly agreeable

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and very nourishing and soothing in hot weather. I think there is a large possible market for nourishing and pleasing people who will drink for social and other reasons. One cannot stamp out an inherited tendency either in one or two generations, and somehow it is thought to be a courtesy to a man to offer him something to drink or something to smoke or something to eat. It would be well to have something to offer him to help on the grape-growing industry of Canada so as to help on the Fruit Growers' Association. (Laughter.) Then these walnuts and almonds and peanuts are exceedingly nutritious—very dry and a large proportion of fat, so they are very nourishing foods, only they are a little bit indigestible. They play the same part in the economy of human nourishment that cotton seed meal and that class of foods do in nourishing animals, and we find by experimenting on them that a very small quantity is all they can stand per day and be healthy. I might mention in passing that nearly all fruits have a very large percentage of their weight that is not edible. Apples and grapes usually have twenty-five per cent. of their weight, potatoes about fifteen per cent., eggs about fourteen per cent., and chickens—depending entirely on whether the dog has chased the chicken to develop muscle or the chicken has been left to feed to develop fat—(laughter)—you have chickens all the way from fifteen per cent. of bone up to ninety-nine and three quarter per cent. of bone. (Laughter.) In many of the finer fruits you have very little waste, indeed, and in that sense fruit is an economical food to the extent that the part that is edible is extremely satisfying to the system. A man who is truly economical—that is, who believes that true economy is making the best use of things—will choose the most economical foods. Let me recommend it to the farmers who find it hard sometimes to get fresh meat in summer that there is no better midday meal than cheese and potatoes—a food that is known to be nourishing in quality and economical, and certainly a thousand times better three times a day than bacon and potatoes, cheaper to be got and easier to keep in the house. Did you ever think what cheap rice means in helping the Chinamen to make cotton and deals cheaper than you can in Waterloo? It is no use blinking that in Canada we are living extravagantly. When we come to places where people can live cheapest, there they can undersell the other fellows; so it is worth the people's while to study out the best foods to make their brains clear and their bodies strong. In England fifty-one per cent., Germany fifty-three per cent., in the United States about sixty-three per cent. of the total earnings of the people go for food. I think Canada is about half way between the two extremes—about fifty-five per cent. of the ordinary earnings of the people go for food. I want to say this in closing, that with the food there might come a good deal of beauty in appearance with palatability, and that will join to the nourishment of the body the qualities of nourishment with the quality of just a little bit of stimulation to make the best use of the nourishment that is taken; and the women of Canada could not do better, in following what is the highest of the higher education, than study how best they can nourish the people—because woman is always and has always been the nourisher of the people, the nourisher of man's body, the bodies of the family, the nourishers of the men's minds in scores of ways, the nourisher of their hearts in scores of ways; and if the hand that nourishes the people fails at its task how can you save the people? Does it make a woman less of a woman of the highest refinement to know how to make the most of these external things that are put in her care? And a little common sense study of foods in the schools and in the clubs and every other way would redound to great advantage to the people of Canada at the present time. Then that will cause us to make the most of this Canada of ours in every sense we can. I would like to say a word on that. The people in different parts of Canada will make all the more of themselves, however, if they will think out into the lives of others as far as they can, and believe that Canada, while a wide country, a big country, is just one country. Now, the Fruit Growers' Associations have a very large influence in helping to cement that feeling of union in our Dominion. The Fruit Growers' Association of Nova Scotia, in the Annapolis Valley, and of Prince Edward Island and New Brunswick, and away out in British Columbia and up through Quebec, all watching the work of the other associations with interest, learn more of their several Provinces by that work than they would otherwise. That is not the only tendency, but is one of the great tendencies helping to let people understand each other and like each other better. Because we have different

characteristics in our people, we are all the better off on account of that. We have the French, who are a little bit artistic, some of us think; they see things a little different than we see them. It is a good quality if not left alone. Then we have the Irish, who say than some of us think they might say—(laughter)—but some of them blossom into orators, and they delight us so much that we can have a good deal of compassion for the other men that talk so much, and they do it so well that we don't object to the way they do it—that is the ruling passion of the people in Ireland, and I, of all men, I think, could speak of the utmost kindness and appreciation of them, but they have a gift of the gab in a wonderful measure. (Laughter.) Then you have the Germans, who intend to keep before us the value of musical culture, and you are not without a good deal of that, in an instrumental sense, in this town, as one can learn from this evening's proceedings. We may call them a singing people, perhaps, in Canada. You have the English who keep on doing things. One characteristic of an Englishman is that he is always energetic, doing something. Scotch people have no chance at all, so they just boss the job. (Great laughter.) Yet we are getting along in Canada pretty well. I hope that we as Canadians will think a little less of our town and our country and our Province and our Dominion and look right out and think of our country and the Empire of which we are no small part, that gives us our institutions and guarantees us a chance to make the most of ourselves; and while doing the best for ourselves in our own limited sphere meanwhile, in the larger sphere do the best we can for our country and humanity and in that way our lives will be helpful in every sense in good works. (Loud applause.)

Prof. L. R. TAFT, of Michigan, then gave an address on the legislation of that State in regard to the San Jose scale and other insects. Copies of the Act were distributed.

Votes of thanks to the speaker and orchestra were passed and the meeting adjourned.

THURSDAY, December 16, 1897.

The SECRETARY read a telegram from Prof. John Craig, of Ithaca, sending greetings and best wishes. He said Prof. Robertson had been called away and therefore could not give details as to the packages which he had collected at Covent Garden, London, and brought with him to Canada. The various packages were placed on the platform for exhibition and inspection.

Mr. A. H. PETTIT drew attention to a ventilated crate that had been specially manufactured, and which he thought would be specially useful during the coming year.

Mr. E. D. SMITH: I have here a resolution with regard to the matter of cold storage. I think we are delighted to have found out that it is possible to ship a number of our fruits to Britain with success, and I think we ought to express our feelings with regard to that, and thanks for the information we have gained.

Moved by E. D. SMITH, seconded by JAS. TWEEDLE, That this Association has listened with deep interest to the information furnished by Prof. Robertson and Secretary Linus Woolverton regarding the result of the trial shipment of tender fruit to Britain in cold storage under the auspices of the Dominion Government, and desire to record our thanks for the same. We appreciate the fact that these shipments have been experimental in every sense and consequently perfectly satisfactory results could not have been expected the first season, and while on the whole the results have been unsatisfactory from a present financial aspect, we are glad to know that they lead us to believe that with further experience a permanent and lucrative market may be confidently looked for in Britain for at least pears, peaches and tomatoes, and probably for grapes. We would, therefore, respectfully urge upon the Government, in view of the vast interests at stake, to continue on an extensive scale the experimental shipments another season, putting large quantities of suitable varieties of Canadian grapes continuously upon one or more of the British markets to test fully whether or not the British palate will ultimately become accustomed to and like the flavor, and conducting at the same time further experiments with other fruits to overcome the difficulties found to exist in getting them landed in

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good condition. We also desire, at the same time, to record our gratitude to the Burlington fruit growers for their plucky experiments this season on an extensive scale on the same line, exporting tender fruits to Britain, and for the report given here to-day of the results of these experiments, which we are particularly glad to know turned out eminently satisfactory from a pecuniary point of view, confirming the results obtained through the Government experiments that at least a number of our tender fruits can be exported profitably under proper conditions and safeguards.

The PRESIDENT: I think this is a very timely resolution.

Mr. A. H. PETTIT: The experiment of shipping fruit to the British market is one of very great importance to this country. We have a great fruit-growing country. You may take the beef, butter, cheese and all the other products of that nature, and once chill them down it is an easy matter to keep the temperature in that condition throughout the voyage, but our fruits being of a nature that creates heat on the way we need a considerable experiment along that line. During the past year we have made progress, but not such as would confirm the opinion that any and every person may readily ship fruit to the British market through the system of cold storage. I think that the experience we have gained during the past season, if continued for another season or two, will enable us to arrive at conclusions satisfactory to all. I don't think the system of cold storage is perfected by any means at the present time. It may be where you don't have so many transfers to make. The question is whether for grapes it will not be better to have a cold air passage rather than a dry compartment with cold storage alone. All these points we have yet to find out, and all these apply to our other perishable products. I think the resolution is very proper and timely, but we must not give up these experiments until we attain perfect success, and I hope the Minister will still proceed along that line until the system is perfect in every sense of the word.

Mr. McNEILL: As one not having anything special to do with the shipment, I would like to say that the fruit growers generally are looking with very great interest on these experiments. Although there may be very little said here about it to-day, yet I can assure you that our people in the west are looking very earnestly towards these cold storage experiments, and that no greater disappointment could be experienced than any hint that the Government would drop the experiments at the present time. It is looked upon as the salvation of our industry. I certainly believe that if we have no outlets for our fruit than those in sight except cold storage, that there will be a very grave disappointment in store for fruit growers. I heartily approve of what has been done, and would like to say a word of praise for the exertions of our friend Mr. Fisher, who certainly deserves credit for the plucky way he has taken hold of the matter and what he has done.

Prof. SAUNDERS: I might say this resolution is very timely. I only wish to reiterate what Prof. Robertson remarked yesterday. I know the Minister is in very hearty sympathy with this work and that no pains or efforts will be spared on his part to carry it to a successful issue, as far as any reasonable amount of work or money will do. I am sure the Association will be well backed by the efforts of the Minister, but he will need the cordial co-operation of all the members to make it a success, and I have no doubt that it will eventually result in successful shipments in a large way of many of our fruits, perhaps not all of them, but many of them, and provide an outlet for our surplus which will be exceedingly valuable to the fruit-growing community.

Mr. E. D. SMITH: I was very much delighted with one remark of Prof. Robertson, namely, that they had urged upon the steamship companies the necessity of providing cold blast in the holds of the vessels for winter apples, and that two lines had arranged to carry them in that way, that is, to provide in the hold of the vessel the same temperature as outside the vessel. I have long been satisfied that that was in a large measure the cause of the immense loss to the apple growers of this country—that the price of our apples had been deteriorated in the British market by at least twenty-five per cent., almost entirely by the fact that they are not carried across in good condition; and at the same time I am satisfied they could be carried without a single barrel being slack or wet

or wasted if the temperature in the hold would be made the same as that outside it, which seems to me would be a very easy matter to make by fans or air-pumps, either drawing the hot air and allowing the cold air to draw in itself or by pumping the cold air in as is done by cold storage plants in winter. Just as soon as the temperature gets down to freezing point, those cold storage plants simply use the outside air, and the machinery necessary to draw in the air is very simple. Two or three horse power will run it, and occupies but little room. I have often wondered why our steamship companies would not take hold of this matter and put into operation on the boats what is done by the cold storage plants. By passenger steamship companies the cold air is drawn in the second and third decks from above, so that the temperature can be regulated as they see fit. Shippers of fruit and vegetables find no way by which they could make these steamship companies do this, but when the Government takes hold of the matter and urges it, then they will do something. I am glad to know that they have done something in that line, and if the fact had been disseminated fully that a thorough test was going to be made of it, those lines would have got all the apples. Anyone could readily see what an enormous thing it would be to this country; it would mean millions and millions of dollars in the past ten years if our apples had been carried over there sound, which I maintain they could be by the cold-air blast. Cold storage means an additional twenty-five cents a barrel on the apples. The steamships, I suppose, hope to make a little additional profit on the cold storage. We know we must have cold storage for summer and some of the early fall apples, and for peaches and pears and tomatoes, but the other and cheaper system will be better in my mind for all kinds of winter apples and late fall apples and grapes, and I hope that the Government will continue to prod up and if necessary bring force to bear on the steamship companies to give us this accommodation.

Prof. SAUNDERS: I meant to have made a remark on the suggestion of Mr. Pettit. It seems to me that it is an exceedingly good one. Any of us who have stored at any time any of those musky or foxy grapes in a room know how the odor and flavor becomes intensified. That is especially the case in my experience with Niagara and other grapes of that character; and I think shut up in a closed cold storage compartment, the exhalations from many of those fruits that have that flavor in any considerable degree, would be more or less absorbed by the other fruits and effect the whole to a considerable extent. I think that idea of Mr. Pettit, as he said, of circulating the air, which would help to carry off any exhalation of odor, would do much to free our grapes—at least to some extent—of that objectionable flavor which the English people find in them, and which we know only requires a little education to remove altogether. The difficulty is to get the education in, and if we can get it in any more effectually in that way by the method of cooling fruit, it is a matter well worth consideration, and I hope it will be thoroughly tested. (Hear, hear).

Mr. G. E. FISHER: While I did the business, a number of others in and around Burlington contributed the fruit, and I don't wish to take the credit of having done the thing myself.

The PRESIDENT: I think the remarks we have heard from gentlemen are on the right line. I am satisfied the main trouble has been with the steamship companies. As long as they can put the apples and fruit in the smallest space and get their money for it, they care nothing; but we never get rid of a grievance without an agitation. We are working on the right lines. The Government is certainly to be commended for the help they are extending to us in this regard, and I am glad you have moved this resolution, and would suggest that the secretary be instructed to forward a copy to the Minister of Agriculture at Ottawa. With that understanding, I will put the motion.

The motion was put and carried unanimously.

Mr. G. E. FISHER: By way of encouragement to those who may wish to ship, I might mention a paragraph from a recent letter from Bristol to me, received in the last ten days, which reads this way: "Those who bought your fruit this year did so with much misgivings, but it has turned out so well in their hands that they will be not only ready but eager purchasers another year."

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METHODS OF MAINTAINING THE FERTILITY OF LAND IN ORCHARDS.

BY WM. SAUNDERS, LL.D., F.R.S.C., DIRECTOR OF DOMINION EXPERIMENTAL FARMS.

It is always a source of great pleasure for me to be with you at your annual meetings. I look back with very much interest to my early connection with this Fruit Growers' Association. It may not be known to many of you that I was one of the earliest directors. I believe I was made a director shortly after I was made a member. The difficulty in getting directors in those days arose partly from the fact that they had to pay their own expenses and hotel bills, and in the early times, before we had any Government grant or any endorsement whatever from the public authorities, the work of the Association was carried on mainly through the individual efforts of the members who took an interest in it. I think it must be about thirty years ago when I first had the honor of occupying the position of a director of this Association, associated with my old friends Arnold and Dempsey, and others who have passed away since then to the better land. When the Government proposed to take into its care the Fruit Growers' Association under the Agricultural Act, and give it an annual grant—I think the first annual grant was \$400 or \$500—we thought a great feat had been accomplished. At that time, from lack of funds and having no journal or annual report to bring our work before the Canadian public, it was naturally carried on with much difficulty. Still we were all enthusiastic in it, we all put our shoulders to the wheel and worked most harmoniously together for the common good, and from those early beginnings this Association has gradually grown to its present position of prominence and importance. I mention those early matters to show what a strong link there is which holds me to this Association, and the reason why I always take such a pleasure in being present with you. I had the honor for five or six years of being president of the Association, and during that time did all I could to further the interests of the work; indeed, I was occupying that honorable position at the time I was appointed to my present office as Director of Experimental Farms, and had to resign in order to take the work I am now carrying on. My sympathies have always been and still are with the fruit growers and horticulturists of this country quite as strong as with the agriculturists, and I am very glad to have the opportunity of bringing before you to-day a subject which I hope will prove helpful to you, that is, to put in a clear common sense sort of way—so that every farmer can understand it—what should be added to the soil in order to replace those elements which are taken from it in the growing of fruit.

It is the chief aim of all intelligent cultivators of the soil, whether engaged in raising cereal or fodder crops or fruit, to so treat the land as to secure satisfactory crops and at the same time maintain the fertility of the soil so that good crops may be continued indefinitely.

FORMATION AND NATURE OF SOILS.

All soils are the result of the disintegration of rocks by the forces of nature, and the intermixture therewith of organic matter resulting from the decay of animal and vegetable remains. Soils vary much in fertility partly owing to difference in the composition of the rocks from which they have been formed, partly to their mechanical condition and texture and also to the variable proportion of organic matter they contain. These variations are commonly distinguished by special terms, such as clayey, loamy, sandy or gravelly soils, indicating the materials which form the larger proportion of their bulk. The productiveness of a soil also depends partly on its power of holding water and of drawing supplies of moisture from below. Water, which in the soil is usually more or less charged with carbonic acid gas is the universal solvent which nature employs to convey food to the rootlets of plants. A good loamy soil will hold much more moisture than either clay or sand, and hence usually produces better results in cultivation.

STORES OF FERTILITY IN SOILS.

All soils contain more or less plant food in a soluble form, which is immediately available for the use of growing plants. On the other hand there is always a large proportion of the elements of fertility which exist in the soil in a comparatively insoluble form, which can only be made available gradually by thorough cultivation of the land and exposing its particles to the beneficial action of the air. By thorough working, the power which the soil has of retaining moisture may be increased and the loss of water by evaporation from its surface lessened. Soil is nature's great store-house of fertility in which is laid up treasures more valuable to national life than gold. There are many mineral constituents in every soil, and quite a number of these are taken up by living plants, but in most instances the quantities used are small, and the store laid up in the land ample. There are, however, three ingredients which plants take in comparatively large proportions from the soil, which must in some measure be restored to it if its fertility is to be maintained, these are nitrogen, potash and phosphoric acid. All arable lands contain these important ingredients, and usually in considerable proportions.

It is estimated that an acre of soil a foot deep weighs on an average 3,500,000 pounds, and that good ordinary loam in Europe will contain, on an average, not less than 3,500 pounds per acre of nitrogen, and sometimes more than that. The quantity of potash in the same area usually ranges from 5,000 to 8,000 pounds, and of phosphoric acid from 3,000 to 6,000 pounds.

From the analyses of soils which have been made by Mr. F. T. Shutt, Chemist of the Experimental Farms, during the past few years, many of them representing large areas, it would appear that the soils of Canada compare favorably with those of Europe in their richness in these important constituents. Those analyzed from different parts of Eastern Canada have average per acre as follows: nitrogen 6,200 pounds, potash 6,500 pounds, phosphoric acid 3,600 pounds, while the average of those examined from the Northwest plains give over 10,000 pounds per acre of nitrogen, 10,500 pounds of potash, and 5,000 pounds of phosphoric acid.

ELEMENTS APPROPRIATED FOR THE PRODUCTION OF APPLE WOOD.

Trees during their growth take a very large part of their substance from the air. The carbon dioxide or carbonic acid gas which animal life everywhere is constantly exhaling is absorbed by the leaves of plants and trees and converted into woody tissue and starchy and saccharine material so necessary for the food of animals. If you burn a piece of apple tree wood weighing 100 pounds you find as a result less than two pounds of ashes, 1.29%. The combustible matter destroyed with the exception of a small proportion of nitrogen has all been taken from the air. These ashes include all the mineral matter taken from the soil, and are said to contain about twelve per cent. of potash and about four and a half per cent. of phosphoric acid, with a much larger proportion of lime. On this basis an apple tree would take from the soil for the production of 100 pounds weight of its wood less than two and a half ounces of potash, about one ounce of phosphoric acid, and probably not more than five or six ounces of nitrogen.

CONSTITUENTS OF APPLE LEAVES.

Let us next consider the constituents of the leaves which, however, are eventually nearly all returned to the soil by their fall and gradual decay. The leaves of several varieties of apple trees have been analyzed by the Chemist of the experimental farms at different stages of their growth with the following results. Gathered on the 25th of May, when they were scarcely fully expanded, each 100 pounds contained an average of about twelve ounces of nitrogen, a little more than four ounces of potash, and less than four ounces

of phosphoric acid, and a small amount of phosphoric acid.

The soil is composed of various elements, and the amount of each is in proportion to the amount of each in the soil from which it is derived.

In the soil, nitrogen, potash, and phosphoric acid are found in the following proportions: nitrogen, 100 pounds; potash, 100 pounds; phosphoric acid, 100 pounds.

Having next to consider the soil in which the fruit is grown, it is found that the soil contains about 100 pounds of nitrogen, 100 pounds of potash, and 100 pounds of phosphoric acid. The soil is also found to contain about 100 pounds of nitrogen, 100 pounds of potash, and 100 pounds of phosphoric acid.

I know that the soil contains about 100 pounds of nitrogen, 100 pounds of potash, and 100 pounds of phosphoric acid, with a small amount of phosphoric acid. They are always returned to the soil for the production of fruit.

Supposing that six barrels of fertilizer would be taken from the soil, it would be taken from the soil for the production of fruit.

of phosphoric acid. The mature leaves collected on the 20th September were found to contain a somewhat larger percentage of nitrogen and potash and a smaller proportion of phosphoric acid, about fourteen ounces of nitrogen, six ounces of potash, and three ounces of phosphoric acid, with fourteen ounces of lime in each 100 pounds of leaves.

COMPOSITION OF THE FRUIT.

The fruit of the apple consists mainly of juice, which forms more than eighty per cent of its weight, and when this is expressed we have a residue which cider makers call pomace, composed of the compressed cellular structure of the fruit with the cores, seeds and skin with some of the flavoring material. The juice consists of water with malic acid varying in proportion in different varieties of apples from one quarter to one and a quarter per cent., and sugar from six to twelve per cent., with a little flavoring material. Everything in the juice excepting the water is compounded by the tree from the gases taken from the air, and hence there is no drain on the soil in the formation of this material.

In the pomace will be found the cores and seeds and these latter are rich in nitrogen, and the formation and maturing of the seed is a considerable tax on the vital forces of the tree. For this reason heavy crops are much less trying to the vigor of the tree if the fruit be thinned. The fruit produced is thus improved in size and quality, and the capacity of the tree for future production economized. Apple pomace contains in every 100 pounds about four and a half ounces of nitrogen, two ounces of potash and less than one-third of an ounce of phosphoric acid.

Having considered the composition of the wood, leaves and fruit of the tree, we shall next consider how much of the fertilizing constituents referred to are taken from the soil in bringing the tree to maturity and in the annual production of the leaves and fruit. Suppose we estimate the weight of the trunk and branches of the tree at 1,000 pounds—which is only a rough guess—and that we have thirty such trees planted thirty-eight by thirty-eight feet on an acre, these will have taken from the soil to produce their wood growth from three to four pounds per tree of nitrogen, (ninety to one hundred and twenty pounds in all) and not more than twenty-five ounces of potash and ten ounces of phosphoric acid, equal to about forty-six pounds of the former and eighteen pounds of the latter per acre. This includes all of these important fertilizers which are taken from the soil for the entire growth of the woody structure of the trees on one acre of orchard.

THE LEAVES.

I know of no basis on which an estimate of the weight of leaves on an apple tree can be founded. It will serve our present purpose however to roughly place them at 100 pounds. On this calculation thirty trees will draw annually from the soil about twenty-four pounds of nitrogen, nine pounds of potash and seven pounds of phosphoric acid, with about eighteen pounds of lime. Since however as already remarked the leaves are always allowed to fall on the ground, where they gradually decay and are most of them returned to the soil, it would be a liberal estimate to allow one-half of the ingredients taken as lost to the land.

THE FRUIT.

Supposing the thirty trees per acre in the orchard to produce an annual crop of six barrels per tree of 130 pounds each, or 180 barrels, 23,400 pounds per acre, there would be taken from the soil for the growth of the fruit crop to maturity about thirteen pounds of nitrogen, six pounds of potash, and less than one pound of phosphoric acid.

THE WASTE AND HOW IT MAY BE RETURNED.

In estimating the total withdrawal of fertilizing constituents from the soil as the amounts are small, we may venture to add to the annual drain on the land for the growth of the leaves and fruit, one-tenth of the quantities required for the entire growth of the woody portion of the trees, as follows:

	Nitrogen.	Potash.	Phosphoric acid.
	lbs. oz.	lbs. oz.	lbs. oz.
For $\frac{1}{10}$ of the total growth of the wood	12 ..	4 10	1 14
For the waste of half the annual growth of the leaves	12 ..	4 8	3 8
For the annual waste in the production of the fruit ...	13 ..	6 ..	1 ..
Total	37 ..	15 2	6 6

All the ingredients taken from the land may be replaced by the use of barn-yard manure, each ton of which of average quality contains while in the fresh condition from eight to ten pounds of nitrogen, ten to fifteen pounds of potash and from six to eight pounds of phosphoric acid. If the manure has been rotted under favourable conditions the proportions of the fertilizing constituents will be somewhat increased. A dressing of about fifteen tons of manure every three years would more than restore the full quantity of nitrogen and more than three times the quantity of potash and phosphoric acid which has been taken from the land. It must however be borne in mind that the active feeding roots of the trees do not cover the entire ground and that they must find all that they require within the area of their distribution hence the return should be liberal.

Nitrogen may be more economically applied by the plowing under of green clover. A fair crop of this sown in the spring and plowed under late in the autumn will give to the soil from 100 to 150 pounds of nitrogen, and if left on the orchard as a cover crop and plowed under the following spring, from eighty to 100 pounds per acre. This crop will also gather potash from the soil and subsoil and present it in available form for the use of subsequent crops to the extent of 100 to 150 pounds per acre and phosphoric acid from thirty to thirty-five pounds. The nitrogen which the clover crop supplies to the soil is taken largely from the air and the fruit grower thus obtains assistance from nature in his endeavours to maintain the fertility of his land. An unlimited store of this valuable element exists in the air which is composed of four parts by weight of nitrogen with one part of oxygen and clover in common with other leguminous plants, has the power of taking in and storing this element in its tissues. This work is said to be done through the agency of colonies of bacteria located in the small gall-like swellings, so common on the roots of thrifty growing clover plants. The roots of clover extend over a wide area and penetrate to a great depth in the subsoil and they are thus able to draw upon supplies of plant food lying beyond the reach of other crops and in this way this plant acts as a permanent enricher of the soil. A careful study of the root system of red clover, has shown that plants one month old have roots extending seven inches into the ground that at two months some of the roots had reached a depth of two feet, and at four months to a depth of four to five feet. In addition to the gain of the fertilizers referred to, the organic matter in the roots and tops of the clover plowed under, improves the texture of the soil and makes it more retentive of moisture. The growing clover also acts as a catch crop during the summer and autumn and appropriates the nitrogenous fertilizers which are brought down by the rain and which when falling on bare ground, on account of their ready solubility pass through the soil and are lost in the drainage waters.

Nitrogen may also be conveniently given in the form of nitrate of soda. This occurs in large beds in Peru, and other parts of South America, mixed with common salt and earthy matter from which it is extracted and purified. Each 100 pounds furnishes about

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fifteen and a half pounds of nitrogen to the soil. The quantity usually recommended is from 100 to 200 pounds per acre. As this salt is very soluble and easily wasted by leaching, it should always be used as a top dressing, and it is more economical to divide the quantity to be used into two or three portions and apply them at intervals of one or two weeks.

Sulphate of ammonia is another source of nitrogen. It is a product made from gas liquors and is more expensive than the nitrate of soda. Each 100 pounds of the sulphate of ammonia supplies twenty pounds of nitrogen to the soil. Other sources of nitrogen are dried blood which contains from ten to ten and a half per cent., fish waste containing from eight to ten per cent. and guano.

SOURCES OF POTASH.

Probably the cheapest source of potash is unleached wood ashes. These contain from five to six per cent of potash, and about two per cent of phosphate of lime. When leached they contain the same proportion of phosphate of lime but the proportion of potash is reduced to about one to one and a quarter per cent. Ashes usually contain also a considerable proportion of lime. Large quantities of unleached ashes are still shipped every year from Canada to the Eastern States where they are sold to farmers at from \$13 to \$18 per ton.

Kainit is a very important source of potash. This is a crude natural potash salt, found in large quantities at Strassfurt, in North Germany, lying in beds more than 1,000 feet below the surface. It contains about twenty-two to twenty-three per cent, of potassium sulphate, equal to about twelve per cent. of pure potash. This is said to be associated with magnesium sulphate, about seventeen per cent. magnesium chloride about fourteen per cent., and common salt, sodium chloride twenty-seven per cent. The quantity of this crude salt recommended to be used, is from 300 to 800 pounds per acre. In another stratum of these valuable potash deposits at Strassfurt, a layer is found consisting mainly of muriate of potash and chloride of magnesium. This is known in commerce as carnallit and contains about the same proportion of potash as kainit. This deposit ranges from fifty to 150 feet thick, and from it most of the potash salts of higher grade are manufactured, such as the muriates and sulphates of potash, each containing about fifty per cent. of potash. Some idea of the importance of these potash deposits may be formed from the fact that more than 9,000 men are employed as miners and labourers in connection with the works. The prices at which these potash salts are usually sold are about as follows, kainit \$12 to \$15 per ton, muriate of potash \$42 to \$45 per ton, and sulphate of potash \$42 to \$50 per ton.

SOURCES OF PHOSPHORIC ACID.

Phosphoric acid is the third of the substances referred to as largely used by growing plants. The chief sources from which this material is obtained are the bones of animals, mineral phosphate of lime or apatite, and basic slag a waste product formed during the purification of iron.

The bones of land animals in their fresh condition contain about forty-six per cent. of phosphate of lime, four per cent. of carbonate of lime, a small proportion about two per cent. of potash and soda, and forty-eight per cent. of gelatine, fat and water. The gelatine contains from three to five per cent. of nitrogen, and the phosphate of lime from eighteen to twenty-three per cent. of phosphoric acid. The phosphate of lime as it exists in bones is insoluble in water and, but very slowly soluble in the soil. It is rendered wholly and quickly soluble when it is treated with sulphuric acid which changes the phosphate to the superphosphate. Bones may also be reduced by the use of unleached ashes, placing the bones whole or coarsely ground in layers in a suitable vessel and covering them with layers of ashes mixed with about one-eighth of their weight of freshly

slacked lime and the whole moistened with water. The ashes being rendered still more caustic by the lime acts on the bones and gradually softens them until they can be crushed between the fingers to a soap-like mass. When reduced to this condition the compound may be mixed with dry muck or loam and applied to the land—100 pounds of hard wood ashes are said to be sufficient to reduce about 100 pounds of bones.

Phosphoric acid may also be supplied in the form of superphosphate of lime made from the mineral phosphate. This as supplied by the manufacturers usually contains from eight to ten per cent. in the lower grades, and thirteen to twenty per cent. of soluble phosphoric acid in the higher grades.

Thomas' slag, known also as basic slag or odorless phosphate, is a third source of phosphoric acid. Many iron ores contain minute quantities of phosphorus which reduces the quality of the ore. In the manufacture of such iron into steel, the process is so conducted that a chemical action takes place in the presence of lime at a very high temperature whereby the phosphorus in the iron is converted into phosphoric acid, and combined with lime forming a phosphate of lime. This is said to be easily decomposed and rendered soluble by the products arising from decomposing humus in the soil and is thus presented to the rootlets of plants in a form easy of assimilation. It is stated that the German factories now turn out about 400,000 tons of this slag annually, and a considerable quantity is also produced in Great Britain and the United States. The phosphoric acid in this waste product is said to be present in the proportion of from thirteen to twenty-one per cent. The slag also contains about fifty per cent. of lime and varying proportions of oxide of iron, magnesia and silica. It is odorless and tasteless.

EXHAUSTION PRODUCED BY CROPS OF FRUIT.

The exhaustion of the soil seems to be greater in all cases from the production of the fruit than it is from the growth of the substance of the tree or vine. The ashes of the pear according to Wolff of Germany contains a little more than twice the quantity of potash that is found in the apple, the proportion of phosphoric acid is also one-third larger. In the fruit of the plum the potash is given as a little higher than that of the pear, and the phosphoric acid the same as in that fruit, whereas in the fruit of the cherry the proportion of potash is the same as that in the pear, and the proportion of phosphoric acid somewhat larger. It should not be forgotten that in the growing of all these fruits the drafts on the soil for potash are heavy, and hence this element should be supplied with a liberal hand.

It seems when you look at the figures I have given you that almost any soil, however poor, ought to continue to grow good crops of apples for a long time, seeing the large stores of the elements of fertility which are laid up in the land; but you must consider the importance of the point I have already mentioned, that the roots of your trees occupy only a limited area, that they must take all the material they require from this limited area; and hence the importance of treating your soil liberally and regularly with such things as careful analyses have shown are really taken away from your land, and which makes the land poorer every season you grow your fruit unless you take the pains to restore to that land an equivalent.

The peach ranks about with the plum in its consumption of potash but uses twice the quantity of phosphoric acid, whereas in the production of grapes the soil is drawn on to the extent of three pounds of potash, per 1,000 pounds of fruit and fourteen ounces of phosphoric acid. While the grape uses these elements of fertility freely in the production of its fruit it uses only about one-fourth this quantity in producing the wood and branches.

The raspberry and blackberry are said to consume one-fifth less potash than that of the apple for the same weight of fruit, and the strawberry according to the analysis of Dr. Goessman contains about two pounds twelve ounces of potash for every 1,000 pounds of fruit, and about fourteen ounces of phosphoric acid. The strawberry plant according

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to the analysis of the Chemist of the experimental farms consumes about five pounds of nitrogen, five and three quarter pounds of potash and one and four-tenth pounds of phosphoric acid for each thousand pounds weight.

This subject is a very important one, and I hope I have made it plain. The soil is the fruit grower's savings bank. There he has stored a large amount of capital. If he uses that capital carefully, if he returns—as he would if he wanted to keep up his savings bank balance—something equivalent to the drafts he makes on it, or a little more, instead of having his account grow poorer from year to year, he will have it become better and richer, his land will be in better condition to continue to give him good crops, and considering the enormous productiveness which is attained by this intensive method of agriculture, he can well afford to deal with the soil in a liberal way. I thank you for the very kind attention you have given me under such unfavorable conditions of voice. (Applause).

Mr. WHYTE: Dr. Saunders says fifteen tons of stable manure were necessary per acre. How many average cart loads or wagon loads would that be? It does not give a very good idea to those who have not weighed a load.

Prof. SAUNDERS: Carts and wagons vary so much in size it is difficult to answer that question. We bring from town to the farm one and one-half to two tons of manure on our large wagon box, and I suppose that would make five or six cart loads. Manure is generally sold by weight where it is sold at all, at so much per ton, and I have adopted that form of expression in the paper for the reason that it is much more accurate than it would be to say so many cart loads. I suppose a cart load of manure would weigh somewhere in the neighborhood of half a ton, but if it is fresh and strawy it would not weigh so much as if it is well rotted and wet.

Mr. E. D. SMITH: I have weighed a good many. A square wagon box packed up as high and packed on as solid as it can be weighs two and a half tons. That is a two horse wagon load, rotted fine.

Mr. HUGGARD: Which plan with clover is most beneficial?

Prof. SAUNDERS: Plowing clover under is most beneficial in the autumn, but it is very beneficial to have the ground covered in the autumn; and where it is cold in the winter and where you are liable to have bare ground I think it would pay the fruit growers to incur a little loss, in fertilizing constituents, and to plow under in the spring, in order to gain the advantage of that cover crop in the winter so as to protect the roots of the trees from injury. The figures I have given are but approximate. We have only been carrying on these clover experiments at the farm for three years, and so much depends on the conditions of the roots and tops of the clover when spring comes that another season I might be able to give you figures which would show a larger proportion of nitrogen. If clover is wintered well—and it does winter well in the greater part of the fruit growing districts—I think it would make a better showing than is given in this paper. I think that the advantage of clover would be sufficiently great to warrant any fruit grower in the fruit growing districts leaving the crop until the spring and plowing it under then. I think taking one season with another he would get the most advantage in that way. I may say that we became so impressed with the importance of this subject of plowing clover under at Ottawa that this past year we have sown clover with nearly every variety of grain sown in our large fields, and I think in two or three years we shall be able to bring the land up in that way to a high state of fertility. We have found by careful experiments that ten pounds of Mammoth Red Clover per acre is about the best proportion to sow. We sow that with our grain—barley, oats and wheat. We find it do very well with oats, although the oats being rank and heavy in growth are more likely to smother the young clover plants than wheat or barley, still we get very good results in Ottawa with the oats. We find as soon as the crop is taken off we have the ground well covered with the young clover plants. They grow rapidly as soon as the shade which the grain has given them is removed. Later they act as a catch crop, catching the fertilizing matter brought down by the rain and storing it up in their tissues.

We have a heavy mat of growth by the fall, and in the spring turn that under and leave it for the next crop of grain, and there is thus added to the soil a store of fertility which will return you very good results in after crops. My impression is that it would be wise to do this every year. It costs a dollar an acre to do it, and it gives the farmer as much nitrogen as he would get from at least ten tons of manure, and the roots of the clover plant going down so deep bring up potash and phosphoric acid. Though they do not really add these to the soil, they bring them up from such depths and store them in the tissues of the plant and place them within the reach of subsequent crops, so that the clover may be regarded as an enricher of the soil in potash and phosphoric acid as well as in nitrogen.

Mr. A. H. PETTIT: Do you consider the turning under of the clover any protection to the roots?

Prof. SAUNDERS: One would think that it would act as a mulch in that way perhaps almost as effectually as it would the other way; yet you have to bear in mind that the turning under of the soil loosens it up and makes it more permeable by the air, and that the cold is more likely to penetrate a loose surface of that character than it is one where the clover has been allowed to grow and the foliage covers the ground. Another point is; if there is a very little snow the clover leaves will catch it in a way that bare plowed ground will not. Every farmer and fruit grower must be expected to use his own judgment in these matters. I have tried to give you the results which have been obtained by us under both conditions, and the experiments should be carried on by every man of common sense according to his own judgment.

Mr. TYE: How many bushels of ashes would you recommend to the acre for apples?

Prof. SAUNDERS: A bushel weighs I believe about forty pounds.

Mr. BURRELL: More than that; nearly sixty pounds.

Prof. SAUNDERS: It depends a good deal on the moisture in the ashes. If they are very dry they would not I think weigh more than about forty pounds; they might weigh fifty, or more than that if they had been exposed to the air and got damp. Supposing them to weigh fifty pounds, then sixty bushels of ashes would give you 3,000 pounds, and taking five per cent. of potash as the quantity in the ashes, which is about what you can reasonably calculate on, you would have one hundred and fifty pounds of potash added to your acre of land, which would be a very fair dressing, and you would also have about sixty pounds of phosphate of lime. You would have besides that a considerable quantity of lime in these 3,000 pounds—probably 600 pounds at any rate.

Mr. TYE: You made a remark that pears require more potash. Would you apply more potash to pears than apples?

Prof. SAUNDERS: I think so decidedly. When we know that potash is taken out of the soil by a crop we must restore it if we want to maintain the fertility of the land, and according to the analyses that have been published the pear fruit takes more potash from the soil than the apple does.

Mr. MCNEILL: You also noted the immense store of mineral food in ordinary soil; in addition to this artificial way of improving the soil, you would also of course strongly recommend the cultivation of the soil, the original manure—from manus, the hand—the working the soil to make this inert food available in addition to adding the material from the outside?

Prof. SAUNDERS:—I would for ordinary crops; there would be no question as to the advantages of cultivation in such case. But we know there is much difference of opinion among fruit growers as to the desirability of keeping their orchards cultivated or uncultivated, that is in grass or clover, that much must be left to individual judgment. If a man finds his trees are making too much wood, and he does not want to stir his soil on that account he can add from some of these other sources sufficient plant food to repair the waste.

Mr. E. D. SMITH: Why will not the apple tree roots penetrate down and take out fertilizing material from the soil?

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ought to have your ashes, poor advice. them, we th where our f large and c (Laughter.) me that cult the plant for in any other taking out p to remain so and if we fo something ea tried to garden, a this kind. not been ab as a cover cr don't like, fo crops very ea

Prof. SAUNDERS: No doubt they will to a certain extent; but when you pull up an apple tree and notice where the large proportion of the feeding roots are located you will find they don't usually run more than two feet below the surface. Of course there is a difference in varieties, but I think as a rule you will find the feeding roots of the apple, or most of them, are within two feet or a little deeper than that from the surface. You will also find that as the apple tree grows, the feeding roots of the tree are more towards the outer circumference of the root area a great deal more than they are in and about the trunk. The idea that a good many people have is that if they put a heap of manure around the trunk of the tree they are feeding it in the best way; but if they would study the growth of the roots they would find that there are very few feeding roots immediately adjacent to the trunk of the tree.

Mr. E. D. SMITH: A good many of us think we have noticed that where an apple orchard is continuously cultivated for a long term of years, instead of getting the good results that we expected, when there is a heavy drain on the soil by heavy crops the apples are small, showing apparently that the fertility has become exhausted. Although we may have had no large crops of apples for several years, and though there has been a heavy dressing of manure, when the test comes the crop seem to be deficient, on good soil too.

Prof. SAUNDERS: Is this where other crops have been taken from the land?

Mr. E. D. SMITH: No, nothing taken off the ground, but coats of manure put on the ground at intervals, and then when a heavy crop came the apples were small when we expected they would have been large.

Prof. SAUNDERS: There are other conditions involved in producing apples of a certain size besides the condition of the soil. As I have explained, water carries everything to the rootlets. There is no other way for the tree to get any food except by solution in water. Now, if the season happens to be a dry one, it is easy to understand that the amount of water in the soil is reduced, and the ability of the roots to get this amount of material, which they must have in order to produce the full size and quality of the fruit, is much lessened by the conditions of the climate; we find the question of season to be the most important of all in growing cereals. You may have your land so charged with fertility that you can hardly get anything more into it with reason, and yet if you happen to have a bad season, if drouth comes on you at a time when you should have moisture in order to be successful, very often you will not have more than half a crop.

Prof. TAFT: I was very well pleased with Prof. Saunders' address, but I think he ought to have kept silent on one or two points. He advised you in the first place not to sell your ashes, but to use them at home. Now, speaking as a Yankee, I think that is pretty poor advice. (Hear, hear, and laughter.) We have been using your ashes and we like them, we think they are first rate, and really that is one of the best fertilizers, and where our fruit growers can get ashes they find they can get lots of fruit, and it will be large and of high color and of good quality, so I think that is pretty poor advice. (Laughter.) Regarding this matter of the apparent running out of orchards, it seems to me that cultivation, as we generally make use of it, instead of securing and conserving the plant for wood-building, results in depletion of the soil, whether it is in an orchard or in any other crop—results in running out of the soil far more than the actual loss of taking out plant food in cropping. On the other hand take the prairie, and soil allowed to remain so, improves, and it seems to me that we ought to get a little advice from that, and if we follow along that line and try to cover that soil in the winter, and turn under something each spring, then we can keep up that soil; and in our own practice we have tried to keep every acre of our orchard and every acre of vegetable garden, a similar soil, covered during the winter with some crop of this kind. While the advice given regarding this clover is excellent, we have not been able to use it as far as we like. It is all right to supply the food, and as a cover crop, where you can get it off early enough. But in our bearing orchards we don't like, for instance, in the case of a peach orchard, to seed down clover and similar crops very early, and if we wait until the middle of August, or even later than that, as

we generally like to, we find that the season is so dry that we cannot get a good catch. The result is that the clover is very weak and often winter killed. For that purpose we find the Crimson clover better than the Mammoth, and it is apt to be winter killed after September, and its growth at best is not so large; and although oats do not supply nitrogen, except what it takes from the soil, we use also largely them as a cover crop. We sow the oats when we work the orchards the last time. They will get to a height of a foot or two feet before they are cut down by the frost, and they will supply a large amount of humus. We value that fully as much in our orchards as a practical supply of nitrogen for our peach crops. We have too much nitrogen there when the growth is rank and results in winter killing, but this humus turned under will aid in holding the plant food, preventing the leaching of the soil, and thus we find it conserves the food if it does not supply it; and we have used this crop too with our crimson clover, sowing a bushel, possibly, of oats with the crimson clover; it acts as partial nurse crop and will tend to hold the snow. Of course in Ottawa I suppose they won't need to hold that snow so much, but with us it blows off and leaves the ground bare; and holding the leaves as well, it will lessen the injury from the freezing and prevent largely the leaching of the valuable elements out of the soil. So that we find these cover crops, whether oats or clover or rye, of great value. Another reason that we like them is that we find along in September and October, after a period of drouth, rains and warm weather are likely to start late growth of the trees and result in winter killing. Now, if you have that cover crop there, it tends to take up soluble food, will check the growth of the trees and aid in the ripening. Our orchardists are using them very largely for this purpose alone.

Prof. SAUNDERS: I think as a dutiful and loyal Canadian that I did good service to the Association in advising Canadians to keep their ashes and use them at home. (Laughter). We are not so much concerned—although we wish our neighbors well—in the prosperity of the Michigan farmers as we are in that of the Canadian farmers; and I must only reiterate the advice given from that standpoint. I am much obliged to Prof. Taft for the suggestions he has made, because he has put the question in another light. I had not supposed that any of our orchards were too rich; and where that occurs, and the soil becomes highly charged with nitrogen and you find a strong rank growth of wood, the cover crop Prof. Taft suggests would be admirable—that of the oats; but the plowing under of the oats merely returns to the soil the fertilizing elements which they have absorbed and assimilated. Every plant takes up a certain amount of these elements from the soil and stores them in its tissues; and these elements are returned in a very soluble form when the plant is plowed under. There was another point which Prof. Taft's excellent observations emphasized, and that is this: That where the soil contains a large proportion of nitrogen, the leaching that Prof. Taft has referred to becomes sometimes a source of serious loss to the soil, because all the nitrogen compounds are very soluble and easily washed away. It is not so with either the potash or the phosphoric acid compounds. They in a very short time after they are applied lose to some extent their solubility and are stored up in the land for future use.

Mr. BURRELL: I think this is an extremely valuable discussion. Speaking of the Niagara district I certainly have not observed any peach orchards that have any excess of nitrogen, and I do not think there are a great many of them in our district; but this question of the Crimson clover is a very valuable one to our particular section. I have been trying for the last three years to ascertain what time it would be best to sow, the amount of seed, and the practical results and so on, and as Prof. Taft says, I found that in the earlier sowing the results have certainly been very much better, and after a great number of sowings, I find it is always most satisfactory to sow at the end of July, and by that time, although one year we did not get very good results as it was so dry—three years ago—the last two years I have succeeded in getting a growth of from five to eight inches high by the end of November. At that time the average plant would be about fourteen or fifteen inches in root system, containing as far as I have estimated 600 to 800 to a thousand nodules of bacteria, nitrogen-secreting nodules; and Mr. Veers, who has made a very close study

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of the Crimson clover, tells me that he thinks if that were plowed under it would give an equivalent to seven or eight tons of barnyard manure. I was under the impression that even if it should winter kill there would not be very much loss unless it was a very open winter, that the loss of nitrogen would be comparatively small; that even if it did freeze in the winter it would still be a profitable crop, and if it didn't freeze in the winter of course we know it is very much more valuable. In our section we have succeeded at the end of May in getting a growth of 2 and $2\frac{1}{2}$ feet high, and the results of such growth have been most satisfactory, showing it is equal to a dressing of ten to fifteen tons of barnyard manure. We sow about twenty pound of crimson clover per acre, because the seed being twice as big as the red clover seed you speak of requires a bigger sowing. I believe it is one of the most valuable crops to follow a strawberry crop, and if I were a large strawberry grower I would always plow down my strawberry bed after the first crop and sow crimson clover. I think many growers who are supplying a large amount of wood ashes to their strawberry crops believe it to be the best fertilizer we can give. The land is fairly rich in nitrogen generally for the first year of the strawberry plant. The second year, as the fruit takes so much potash and phosphoric acid, we supply ashes, and so far as I understand it the bacteria work far more readily when there is a good supply of lime and potash, and as the ashes contain both these elements to a large extent I believe it is an ideal crop for clover to follow, and in each case I have had far greater satisfaction on the strawberry plowed under by my clover than in any other shape, and in that way you get the nitrogen as well for the next crop.

Prof. SAUNDERS: I didn't mention the crimson clover for the reason that we have had such poor success with it in Ottawa. It always winter kills with us, and the only way we can get a crop at all is to sow it early in the spring and sow it alone, then we get a fair crop at the end of the season; but the root system of the crimson clover, being an annual, is comparatively shallow and since the roots are valuable and rich in nitrogen, we prefer the deeper rooted clovers; but if you can use it to advantage in Niagara it is a good thing. I would like Prof. Fletcher to give us a little of his experience with tests of crimson clover.

Dr. FLETCHER: The results of the tests of crimson clover were practically as Prof. Saunders has said. Sowing at the different times, we have never been able to carry them over winter in a satisfactory way—three-quarters of the plants were always killed. Sown in the spring they made before September a good head of green manure to be plowed in. It is not with us a valuable crop to sow at all, and we have substituted for it the Mammoth Red if we wanted to winter it over, and then plow it in in the spring. One important point in sowing the seed of the clovers is to recognize the difference in the size of the seed, and where you sow ten pounds of the red clover, sow six of Alsike and sixteen or eighteen of *Incarnatum* or crimson clover.

Mr. BURRELL: Prof. Saunders mentioned that the roots of the Crimson clover were valuable so far as nitrogen was concerned. You are only alluding to its growth that year?

Prof. SAUNDERS: Yes; we have no experience with it the second year.

Mr. BURRELL: The second year that we plowed it under the tops contained two-thirds more nitrogen than the roots, and the nitrogen is constantly passing into the tops till the time of maturity, therefore it is more valuable to plow it under before blossoming.

Rev. Mr. ANDREWS: The difficulty to get clover seed to take in the summer is getting the land solid enough if you plow it, and also having the shade. In England, they use crimson clover to a great extent for sheep food, and they adopt this plan; directly a crop of wheat or barley or oats is taken off, having a drill which cuts sharp into the ground and putting it right on to the bare stubble and that takes very well. I have tried an experiment this year which promises to be fairly successful, and it is this: The last time I cultivated my corn I sowed it with clover and the catch seems to be very good.

Dr. FLETCHER: Do you roll it?

Rev. Mr. ANDREWS: No.

Dr. SAUNDERS: We find sowing clover during the first part of July very successful if the land is rolled, but it must be rolled immediately. The rolling presses the surface of the soil, and the ground water which is finding its way up to the surface and being lost by evaporation is, by the pressing of the soil in which the seeds lie, retained, and this gives more favorable conditions of moisture for the first few days to the clover plant and helps to start it evenly and uniformly.

Mr. JONES: Ashes has the effect in stiff soils of making them very sticky. Of course, we overcome that difficulty somewhat by getting large quantities of humus in the soil, but nevertheless, it causes it to be more compact and harder to cultivate. I think the German potash salts might possibly be more advisable.

Dr. SAUNDERS: Where there is that difficulty of the ashes making the soil more tenacious, the use of the German salts might be preferable, but the addition of fifty or one hundred bushels of ashes to an acre of land makes so small a proportion of the soil after you plow it in, that I should hardly think that it would as a rule have much influence in modifying the actual physical character of the soil. I know it does in some cases, but as a rule I should hardly expect that it would; but where it does, then I think the kainit would not be open to the same objection.

Mr. JONES: I was speaking now rather of stiff clay soils that have been under cultivation for 100 or 125 years, or perhaps longer, and as far as I know, clay cultivated in that way gets more packed and closer grained year after year.

Dr. SAUNDERS: Of course clay soils, as they are made up largely from granite rocks, contain a larger proportion of potash in unavailable form, that is, not immediately available, than sandy soils, and as a rule do not need so much potash, since they have a very liberal store in their constitution naturally, and if a soil is worked so as to get that potash in a soluble and available form, the crop can get a good deal from what the original store laid up in the ground will supply.

Mr. MCNEILL: I think you will find few farmers on clay ground who will think there is much benefit in using ashes. Where you require special quantities of it fruit growers are in favor of it. There is a very strong prejudice in the minds of the farmers against using ashes, and to day they are selling them because they don't believe they are any good, and they are dealing with it from what they believe to be experience. I live right opposite an ashery and the ash pedlars go round near my place and they get a full supply and I get all the leached ashes for nothing. There are hundreds and hundreds of loads there that have been dumped in the marshy places to fill up land, showing the appreciation that farmers have of ashes. I put hundreds of loads of leached ashes on my land and I get some very fine results from their use. I find them to have splendid effects under certain circumstances, but I believe the average farmer does not get the results that he is led to believe from the reports of such societies as this and from sandy soils. What has been said in regard to cover crops is particularly true. Different crops require different treatment. I would be very glad if I could get a cover crop and get my grapes too. I get much better results by plowing my vineyards in the fall. There are two or three reasons for that. I believe that one of the chief reasons is that we must of necessity cut a great many roots in plowing the land. During the growing season the upper and richer portion of the soil is being filled with grape roots. When you plow that you cut a great many of these. In the following spring these roots strike out again and once more fill the soil with roots. I notice that in the middle of the furrow we cut larger roots than usual, and I was led to examine those roots and I found where the roots were cut in the fall, during the winter they actually had nodules on them and in the spring were ready to send out a dozen branches from where we had cut them in the fall. I believe the cutting them in the spring instead of in the fall would cause a considerable delay, and that is one of the advantages we have had from plowing the vineyards in the fall. We always plow in the fall and of course there is the additional advantage of forwarding the spring work.

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RATES OF FREIGHT ON APPLES.

Mr. BOULTER moved the following resolution in reference to rates of freight on apples, seconded by Mr. HUGGARD :

That the President, A. H. Pettit, Geo. Fisher and the mover be a committee to wait on The Traffic Association of Canada, in regards to the present rates on apples and other fruits to Manitoba, Northwest and British Columbia, and if possible, receive a uniform rate from different points in Ontario and a reduction in the present ones.

Mr. BOULTER, in supporting the resolution, said : When we started this Association we had no uniform rates. By united action we succeeded in not only getting a uniform rate on all the goods packed, but also a uniform rate to the different points in Ontario. As Prof. Robertson remarked, the home market is a very important one. From traveling through Manitoba for the last fourteen or fifteen years, I am satisfied it is going to be a very desirable market for the fruit growers of Ontario. I have a large orchard myself and I would like to see a chance for us to send our surplus apples to that country. At present, a large proportion of the apples used in Winnipeg are American apples. To get a barrel of apples there the uniform rate is 150 pounds in a barrel. Now at present, a barrel of apples going to Winnipeg would cost from \$1.10 to \$1.20 a barrel, to Calgary it will cost from \$2.25 to \$2.75. To Victoria, about 2,000 miles the other side of Winnipeg, it will cost about two cents more than to Winnipeg. That is on account of the competition we have with the Great Northern and the Northern railways, and down in the Kootenay and Slocan country there is a large amount of apples used. I have a great respect for our American friends, but I want our boys to eat Canadian apples. I think we will make some headway with this Freight Traffic Association. We succeeded in getting a uniform rate from every point in Ontario, and we should endeavor to get the rate of apples so that a person can buy them and consume them in Calgary and those points west.

The PRESIDENT : I think this is rather an important matter ; in fact, I referred to it in my address, that we should look after the markets of the Northwest and Manitoba, because I believe in the near future there will be a population there that will demand a large quantity of fruit. They never will be able to raise the apple to any extent in that country, and we should be able to send our apples out there at remunerative rates to the grower. I think the resolution is in the right direction and should be supported.

Mr. McNEILL : Why limit it to apples ? We have a high rate on all other classes of fruit.

At the suggestion of the President, Mr. Boulter amended the resolution to include all fruit, and, as amended, the resolution was put and carried unanimously.

REPORT OF COMMITTEE ON REVISING THE CONSTITUTION AND BY-LAWS.

Mr. RACE reported on behalf of the committee on by-laws. He explained that when this Association was organized it had but one object, to further the fruit culture of the Province. Since that time its functions have so largely widened that it has embraced other things besides fruit culture—floriculture, forestry and everything pertaining thereto—and still the constitution has been referring all the way through only to fruit culture. It was found necessary to change it so as to make it cover and embrace all these different departments that have been taken up during the last few years. Another reason why it is necessary to revise the constitution, is that it conflicts in some of its provisions with the Agriculture and Arts Act of the Province of Ontario.

The PRESIDENT : That can only be considered a notice of motion as far as the constitution is concerned. We cannot change the constitution at this meeting.

Mr. RACE then read the report from the beginning.

Your committee appointed to revise and amend the constitution and by-laws of the Ontario Fruit Growers' Association, beg to report that they recommend the following changes, substitutions and amendments:

Art. I.—To remain unchanged.

Art. II.—Changed to read: "Its object shall be the advancement of the science and art of horticulture in all its branches and forestry by holding meetings for the discussion of all questions relative to horticulture and forestry, by collecting, arranging and disseminating useful information, and by such other means as may from time to time seem desirable."

Art. III.—To remain unchanged.

Art. IV.—Changed to read: "The officers of the Association shall be a president, vice-president, a secretary and a treasurer, or a secretary-treasurer, two auditors, and thirteen directors."

Art. V.—To remain unchanged.

Art. VI.—Changed to read: "This constitution may be amended as provided for by section 32, sub-section 1, of the Ontario Agriculture and Arts Act."

Art. VII.—To be amended by the substitution of the words "horticulture and forestry," for the words "fruit culture," in the fourth line.

Art. VIII.—To remain unchanged.

It is further recommended that the by-laws be amended by striking out clause 1 and substituting therefor:

"The Board of Directors at its first meeting shall appoint from among its own number or otherwise a secretary and a treasurer, or a secy.-treas., and from among its own members an executive committee to consist of three members, one of whom shall be the president."

Recommended that an additional clause be entered here to read: "The president and vice-president shall be *ex officio* members of the board of directors; and the president, or in his absence, the vice-president, an *ex officio* member of all committees."

Clause 2. To be amended by changing the words "fruit growing" in the third line to "horticulture and forestry."

Clause 3. To be amended by changing the words "fruit culture" in the fourth line to "horticulture and forestry."

Clauses 4 and 5 to remain as they are.

Clause 6. To be amended by changing the words "five members" to "ten members."

Clauses 7 and 8 to remain unchanged.

Clause 9. To be struck out and the following substituted therefor: "The executive committee shall authorize all expenditure, and audit and pass all accounts, which shall thereafter be paid by the treasurer."

Clause 10. To be amended by striking out the first words "It shall be the duty of," and changing the words "to keep" to "shall keep."

Clauses 11 and 12 stand unchanged.

Clause 13. To be amended to read: "The order of business shall be; (1) Reading of minutes; (2) Reading of Directors' report; (3) Reading of Treasurer's report; (4) Reading the Auditors' report; (5) Reading reports of Standing Committees; (6) President's Address; (8) Miscellaneous business."

Clause 14. To be amended to read: "These by-laws may be amended at any general meeting as provided for by section 32, sub-section 1, of the Agriculture and Arts Act."

Clause 15. To be struck out and the following new clause added: "The election of officers shall take place at the morning session of the last day of the annual meeting in

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The sub-clause to clause 15 to be amended by striking out all the words preceding the words: "The reasonable and necessary expenses of directors and officers in attending meetings of the Board of Directors and of Committees, shall be provided from the funds of the Association."

Clause 16. To be amended to read: "It shall be the duty of the directors of the Fruit Growers' Association of Ontario to encourage the formation of horticultural societies in affiliation with this Association."

Clause 17. To be struck out.

Clause 18. To be amended by changing the last word "ten" to "twenty-five."

Clause 19. To be amended by striking out the words "at their own request."

Clause 20. To be amended by striking out the words "local fruit growers" in the first line, and the word "to" in the second line.

Clause 21. To be struck out.

Clause 22. To stand unchanged; also sub-clause to clause 22, except changing the word "of" used the third time in the first line of the latter to the word "for."

And your committee would recommend that the clauses of the amended and revised constitution and by-laws be numbered consecutively from the beginning, removing all "constitution" and "by-law" distinctions.

M. PETTIT, Chairman.

The PRESIDENT cited article six of the constitution to show that any changes would have to be deferred till next year, and considerable discussion took place on this point.

Moved by JOS. S. SCARFF, seconded by MR. BEALL, and resolved, that the report of the special committee on constitution and by-laws be received and considered as a notice of motion, to be acted upon at our next regular meeting to be held in St. Catharines, and that copies of proposed changes be printed for distribution amongst the members of the Association.

CONSTITUTION AND BY-LAWS OF THE ASSOCIATION.

CONSTITUTION.

Art. I. This Association shall be called "The Fruit Growers' Association of Ontario."

Art. II. Its object shall be the advancement of the science and art of fruit culture by holding meetings for the exhibition of fruit and for the discussion of all questions relative to fruit culture, by collecting, arranging, and disseminating useful information, and by such other means as may from time to time seem advisable.

Art. III. The annual meeting of the Association shall be held at such time and place as shall be designated by the Association.

Art. IV. The officers of the Association shall be composed of a President, Vice-President, a Secretary, or Secretary-Treasurer, and thirteen Directors.

Art. V. Any person may become a member by an annual payment of one dollar, and a payment of ten dollars shall constitute a member for life.

Art. VI. This Constitution may be amended by a vote of the majority of the members present at any regular meeting, notice of the proposed amendments having been given at the previous meeting.

Art. VII. The said Officers and Directors shall prepare and present at the annual meeting of the Association, a report of their proceedings during the year, in which shall be stated the names of all the members of the Association, the places of meeting during the year, and such information as the Association shall have been able to obtain on the subject of fruit culture in the Province during the year. There shall also be presented at the said annual meeting a detailed statement of the receipts and disbursements of the Association during the year, which report and statement shall be entered in the journal and signed by the President as being a cor-

Local Fruit Growers' Association.

16. It shall be the duty of the officers and directors of the Fruit Growers' Association of Ontario to encourage the formation of local fruit growers' horticultural societies in affiliation with the Ontario Association.

17. Any one may become a member of such local society for one year upon payment into its treasury of a minimum sum of one dollar; and a compliance with clause 18 of these by-laws shall constitute him also a member of the Ontario Association for the same term.

18. On the receipt of the names of such members, with the required fees, the secretary of such local affiliated society may transmit their names and post office addresses, together with the sum of eighty cents for each to the Secretary of the Fruit Growers' Association of Ontario, who will enter their names as members of that society, entitled to all its privileges, providing the initial number of such names be not less than ten.

19. Each local society so affiliating, with a membership of not less than twenty-five shall be entitled to a visit from some member of the board of directors or other prominent horticulturist once a year, at their own request; it being understood that the railway expenses of such speaker shall be paid by the Ontario Society, and the entertainment provided by the local society.

20. The proceedings of such local fruit growers' horticultural societies shall, on or before the 1st day of December of each year, be forwarded to the secretary of the Ontario Society, who may cull out such portions for the Annual Report to the Minister of Agriculture for the Province, as may seem to him of general interest and value.

21. These local societies, if formed in cities, towns or incorporated villages, may be formed under the Agriculture and Arts Act (see sections 37, 46 and 47), and receive their due share of the Electoral District grants for the support of such societies.

22. Each local affiliated society is further expected to send at least one delegate to the annual meeting of the Fruit Growers' Association.

The Directors of the Fruit Growers' Association of Ontario of the Agricultural District in which such society is formed, shall be *ex officio* a member of the executive committee of such local society and receive notices of all its meetings.

AGRICULTURAL DIVISIONS.

1. Stormont, Dundas, Glengarry, Prescott, and Cornwall.
2. Lanark North, Lanark South, Renfrew North, Renfrew South, Carleton, Russell, and the city of Ottawa.
3. Frontenac, city of Kingston, Leeds and Grenville North, Leeds South, Grenville South, and Brockville.
4. Hastings East, Hastings North, Hastings West, Addington, Lennox, and Prince Edward.
5. Durham East, Durham West, Northumberland East, Northumberland West, Peterborough East, Peterborough West, Victoria North (including Haliburton), and Victoria South.
6. York East, York North, York West, Ontario North, Ontario South, Peel, Cardwell, and city of Toronto.
7. Wellington Centre, Wellington South, Wellington West, Waterloo North, Waterloo South, Wentworth North, Wentworth South, Dufferin, Halton, and city of Hamilton.
8. Lincoln, Niagara, Welland, Haldimand, and Monck.
9. Elgin East, Elgin West, Brant North, Brant South, Oxford North, Oxford South, Norfolk North, and Norfolk South.
10. Huron East, Huron South, Huron West, Bruce North, Bruce South, Grey East, Grey North, and Grey South.
11. Perth North, Perth South, Middlesex East, Middlesex North, Middlesex West, and city of London.
12. Essex North, Essex South, Kent East, Kent West, Lambton East, and Lambton West.
13. Algoma East, Algoma West, Simcoe East, Simcoe South, Simcoe West, Muskoka, Parry Sound East, Parry Sound West, Nipissing East, Nipissing West, and Manitoulin.

SAN JOSE SCALE.

The SECRETARY read the following report :

Early in the month of June it was reported that this terrible insect enemy had been found in an orchard near Niagara. Your executive, desiring that our Association should be foremost in every good work in the interest of fruit growers, resolved upon decided steps for the purpose of stamping out this evil, and of preventing its further introduction. An article was written by the Secretary for the *Canadian Horticulturist*, describing the insect and warning growers against it.

The Secretary also wrote letters at once to the Minister of Agriculture, both of the Province and the Dominion, asking for united effort in the matter, and that Prof. Panton of the O. A. C., Guelph, and Prof. Fletcher of Ottawa be at once despatched to investigate the extent of the evil. In response to our request, both these gentlemen were sent on Thursday, 10th of June, and in addition Mr. W. M. Orr, Provincial Superintendent of Experimental Spraying, and Mr. John Craig, Horticulturist of the Central Experimental Farm.

About thirty growers representing our Association, especially those living in the Niagara district, met at St. Catharines, and proceeded with the party to Mr. Thonger's farm, ten miles west of Niagara. Here the scientists, sent by the government, examined the trees said to be affected, and identified the insect as the dreaded San Jose Scale. They found a large number of trees affected. The party then gathered together and appointed Mr. W. M. Orr, Chairman, and L. Woolverton, Secretary. After several addresses the following resolution was carried unanimously.

Moved by L. Woolverton, Secretary of the Ontario Fruit Growers' Association, seconded by W. H. Bunting of St. Catharines, and unanimously resolved :—1. That this meeting, representing the Ontario Fruit Growers' Association and the fruit growers of the Niagara district, desire to thank the Hon. Sidney Fisher, Minister of Agriculture for the Dominion, and the Hon. John Dryden, Minister of Agriculture for Ontario, for the kind consideration shown by them in our welfare in sending us professors J. Fletcher and J. Craig from the Central Experimental Farm, Ottawa, and Professor J. Hoyes Panton of the Agricultural College, Guelph, and Mr. W. M. Orr, Superintendent of Spraying for Ontario, to meet us for the purpose of obtaining our views regarding the best means to be employed for the prevention of an invasion by the San Jose Scale.

2. That this meeting earnestly request the Ministers of Agriculture, both for the Dominion and the Province of Ontario, to send out competent inspectors to inspect the orchards and nurseries in southern Ontario at the earliest possible date, and that, in case the area affected should be found to be small in extent, that the trees and plants affected be utterly destroyed and the owners compensated for the same, and if the pest is found to be widely scattered, we request that very effective measures be adopted for the destruction of the insect.

3. That we ask the Dominion Government to pass vigorous legislation prohibiting the importation of nursery stock from the United States, except under the most rigorous inspection, and that the ports of entry through which such stock may be admitted, be confined to one or two points only.

4. That the importation of fruit from States where the orchards are known to be infested with the San José Scale be also entirely prohibited.

Another meeting of the growers about Winona, Hamilton and Burlington, was held at the Royal Hotel, Hamilton, on Saturday the 19th of June, at which the same officers presided, and the same gentlemen were present to represent the Dominion and the Province, except Dr. Fletcher. Prof. Panton of the O.A.C. Guelph, Prof. J. Craig of the Central Experimental Farm, Ottawa, and others addressed the meeting. A committee, consisting of A. H. Pettit, E. D. Smith, A. W. Peart, Geo. E. Fisher and W. M. Black, was appointed to bring in a resolution. The following is a copy of the resolution which was unanimously carried :

Resolved,—

1. That the importation from the United States, or any other country where the San José scale is known to exist, of nursery stock and such fruits as are affected by the scale, be entirely prohibited ;

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2. That a thorough inspection of all nurseries and of orchards in those districts in which the scale has been found to exist be at once entered upon, and that the trees so affected shall be uprooted and burned; and that the growers who may have trees affected by the scale and thereby be subjected to serious monetary loss, be in a measure compensated for their destruction;

3. And we beg most respectfully to request the Honorable Minister of Agriculture to at once take such action as will effectually destroy this enemy to the horticultural interests of our country, and prevent the importation of trees and fruits in which may be concealed the germs for future development.

The secretary was instructed to forward copies of this resolution to the Members of Parliament representing fruit sections, asking them to urge upon the Government the most vigorous action possible.

Mr O. C. JAMES, Deputy Minister of Agriculture, then laid before the meeting the San Jose Scale bill as it had been presented to the Legislature by the Hon. John Dryden, Minister of Agriculture. He explained the bill clause by clause, pointing out the force of each, and alluding to difficulties that had been met with in drafting it. Reference was made to the fact that the prohibition of importation of stock could be considered only by the Dominion Parliament. He further explained that the question of compensation was one likely to be discussed and opposed by some members of the Legislature. He pointed out the fact that the bill was very stringent, but Mr. Dryden considered the great damages threatened to the fruit interests demanded heroic or radical treatment. The meeting then decided to hear the papers by Mr. Orr and Dr. Fletcher before entering upon the discussion of the bill or taking action.

THE SAN JOSÉ SCALE.

By Mr. W. M. ORR, FRUITLAND, ONT.

It is uncertain where the San José Scale originated. It is known to exist in Australia, Chili, the United States and Canada. The first reliable information that we have of it is that it was found in the San José Valley, California, in 1870. It was at once recognized as a serious menace to the fruit-growing interest of the State. The spread of the scale from the point of original infestation was rapid, its area increasing in every direction. In 1873 it had become a serious pest. In 1880 Professor Comstock said it was the most pernicious scale insect known, and that he had never seen any other species so abundant and so injurious. In view of its serious nature he named it *aspidiotus perniciosus*. It was not discovered east of the Rocky Mountain until 1893. Now it has been found in nearly every State, and quite extensively distributed in some of them.

Trees from New Jersey nurseries have been the principal source of infestation in the Eastern States and Canada. The source of their infestation was Japan plum-stock imported direct from the San José Valley, California, in 1886 or 1887.

Professor Smith reports that he has located the scale in nearly every county in New Jersey, the number of localities actually ascertained being upwards of 100.

Mr. H. G. Hubbard, one of the assistants of the Department of Agriculture at Washington, was sent to Florida in the spring of 1894 to visit the infested district. He reported that many thousands of trees were infested, including nearly every orchard within a radius of five or six miles.

Professor P. H. Rolfs reports that the orchard where the scale was first found is now practically killed, less than five per cent. of the trees remaining. Several other sections were found to be infested, and out of 1,200 acres of orchard about De Funiak springs, 160 to 200 acres are affected.

Professor J. M. Aldrich, of Idaho, says that it is the most dreaded of all insect pests and earnest effort is made to prevent its getting a foothold in new localities.

In Massachusetts frequent occurrences have been found, among them being four points near Boston. This is of special interest in view of its being the most northerly occurrence of the scale. In Talbot county, Maryland, J. H. Reip's orchard of fourteen

acres, consisting of apple, cherry, plum and peach, from one to eight years old are all infested. At Riverside, E. Dow's orchard of twenty acres is practically all infested and many trees have died.

In Briggs and Showman's orchard of 20,000 trees the scale was discovered; after a critical examination only thirty trees were found infested. On a further examination within three months about 1,000 trees were found infested.

Professor Smith of New Jersey urges upon the owners the supreme necessity of stamping it out if they wish to preserve their orchards.

In some cases the infested trees have been uprooted and burned. In other cases thorough spraying has been given. The results so far obtained from spraying, however, are far from satisfactory. In a letter dated January 13th, 1896, Professor Smith reports that in South Jersey orchards matters are much worse than they were a year ago.

The Georgia Experimental Station Bulletin, 1897, says, two years ago few orchardists in Georgia had heard of the San José Scale. To-day, however, our fruit growers are aghast at the prospect; for the rapid increase of the scale and its power to devastate are better understood.

It is at last realized that not only are our orchards in danger but the existence of all deciduous vegetation is threatened should the pest once become distributed generally throughout our forests; for in that case all hope of it is final extinction would be lost and it would remain a standing menace forever. The people are clamoring for detailed information, for remedies and immediate and stringent legislation. Far the best prescription is the axe and the matchbox. Where the trees are badly infested their loss is inevitable, even should remedial treatment succeed in riding them of the pest, for their vitality will be found to have been sapped to such an extent that they will never prove profitable. Time, money and future trouble will be saved by adopting heroic treatment. Moreover it is almost an impossibility to absolutely extinguish the scale when once fully entrenched without the destruction of the wood on which it nourishes. Our first advice therefore is under any and all circumstances to grub up and burn infested trees. It will pay in the end.

The latest bulletin published by the Ohio Agricultural Experimental Station dated July, 1897, says: The presence of this insect on any ones premises is a calamity and uncontrolled becomes a public danger that should not be tolerated. Against this most insidious pest both nurserymen and fruit growers are alike practically helpless in detecting its presence until it has ceased to be the insignificant atom that it at first appears, and has become master.

Heretofore orchards and nurseries were considered as the only places in special danger, but recent discoveries of the pest on forest and ornamental trees shows that this was a mistake. It has been found on the black walnut, mountain ash, basswood, maple, willow, poplar, elm and chesnut.

It is usually the case that as we become more familiar with a species, some vulnerable point is found, or a stage during which it can be managed with greater ease than at other times. It must be confessed that in the case of the San José Scale, the better we come to be acquainted with it the more we see to fear of its ravages, and of the great labor involved in its eradication. No one who has not seen the work of this pest where it has had full sway can understand its fearfully destructive nature. If then, the variety affected is not satisfactory or if the trees have passed their best, or the inner bark has been discolored, it would be far better to end the matter at once and save expense and trouble by burning the trees. The only scale to be trusted is the dead scale. As far as any practical service is concerned from natural enemies, this subject might be dismissed with these words "there are none." After making experiments there is nothing to indicate that either the fungous or the insect enemies have had any influence even in holding the pest in check. We have little if anything to expect for the present at least, from the aid of natural enemies.

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THE SCALE IN CANADA.

When the Hon. John Dryden, Minister of Agriculture, learned of the occurrence of the San José Scale at Mr. C. Thonger's orchard, at Niagara, he directed Professor Panton of the Agricultural College, Guelph, and myself to visit the orchard and learn the extent of the infestation, and if possible ascertain from what source it came.

It soon became apparent that the pest had been introduced on nursery stock, and as we know that two nurseries in New Jersey had been infested, I wrote to all the nurserymen in Ontario and to all dealers that imported trees asking for a list of all the stock that they had imported from these nurserymen in the past five years, and the names of the parties to whom it was sent. In this way I located about one thousand trees that had been sent to eighty-five points in Ontario, all the way from Chatham to Ottawa. I have visited about sixty of these points and located the scale at four of them. In some cases the trees were all dead, in other cases they were clean and doing well.

1. The first known or reported occurrence of the San José Scale in Ontario was on trees in the orchard of Mr. John Van Horn, in the County of Kent, near Chatham, in February, 1897, on trees purchased from the Parry Nurseries in New Jersey in 1895. Mr. Van Horn noticed that some of the trees were dying, and that a peculiar encrustation was forming on them. He sent specimens of the wood to Professor Fletcher, of the Experimental Farm, Ottawa, and was at once informed that his trees were infested with the San José scale. Vigorous measures to exterminate them were at once begun. They were treated with whale oil soap, two pounds to the gallon, two applications, followed by two applications of sulphur, salt and lime solution. Mr. Van Horn was not satisfied with the results, and to make sure of their destruction uprooted and burned the infested trees. Mr. Van Horn wrote in November saying: "The scale is completely exterminated in my orchard. I have watched closely all summer and cannot find any trace of it." But on examining the trees with him after this writing, we located the scale on several trees within a short time, the probability is that a considerable portion of his orchard is infested.

2. Part of the same lot of trees which were bought by Mr. Van Horn from the Parry Nurseries, New Jersey, were sold to another man and planted on a farm some miles from Mr. Van Horn's. These were found infested and were uprooted and burned last spring. I have not been able to visit this farm and do not know whether any infestation remains.

3. The third occurrence was in the orchard of Mr. C. Thonger, in the County of Lincoln, near Niagara-on-the-Lake. He thinks that the scale came on nursery stock purchased from S. Oumpson, of Niagara, a local dealer, who said that he purchased the stock from F. E. Young, of Rochester, N. Y., in 1894. In the spring of 1897, Mr. Thonger noticed that his trees were not doing well, and presented an ashy greyish appearance. He sent some of the affected wood to Professor Howard, Chief of the Department of Agriculture, Washington, who pronounced it San José Scale and advised that prompt and thorough means be taken to stamp out the pest. Mr. Thonger began at once earnestly working to accomplish this. He has sprayed his trees every week during the summer with whale oil soap solution, and used a wire brush successfully on the trunks and larger limbs, but he says that it is easier to destroy the ninety-and-nine on the trunk and larger branches than the one on the small twig. Mr. Thonger is not at all satisfied with the results of his efforts to destroy the scale. In his pear orchard of 150 trees, where the infestation was first discovered, the vitality of the trees was seriously impaired, and after treating them all summer, as some of them were showing signs of blight, he uprooted and burned them all. He says that the infestation in his peach orchard of sixteen hundred trees covers eight times the area it did last spring. He says that he is convinced that we cannot live in this country as fruit growers along with the scale. He thought at one time that we could control it, but the apathy shown by fruit growers, and the labor and expense of treating it, has changed his mind, and he believes that it cannot be treated successfully.

Mr. Thonger courteously received interested visitors, and gladly gave them all information in his possession. Many fruit growers received their first practical knowledge of the San José Scale and how to find it from him.

4. Was on trees purchased from Lovett's Nurseries, New Jersey, in 1894, and planted on a farm between Grimsby and Hamilton. Eight trees were found infested and were at once dug up and burned.

5. Was on trees traced from the Lovett Nurseries in New Jersey, purchased in 1894, and planted on a farm between Hamilton and Oakville. Two trees were badly infested and were immediately destroyed by fire.

6. Occurrence No. 6 was on the home farm of Mr. John D. Wigle, near Kingsville, in the County of Essex. The infestation was brought to this orchard on Abundance Plum trees purchased from a dealer in 1894. They were planted alongside of a pear orchard of about sixteen hundred trees, nine years old.

In company with Messrs. G. Mills and M. Bromer, County and Township Fruit Tree Inspectors, we examined this orchard and found all the plum trees and about one hundred and fifty pear trees badly infested. There is little doubt but that the whole orchard is affected beyond cure.

7. Is on Farm No. 2, belonging to Mr. J. D. Wigle, about half a mile distant from first orchard. This orchard consists of about five hundred plum trees which were bought from another dealer and planted in 1884. We found about one hundred trees infested. We examined a peach orchard adjoining and found it infested.

8. Was in a peach orchard near Kingsville. Our time was limited; we only examined a few trees but found the scale. We did not see the owner, and have no information as to where the stock came from.

9. Was in a pear orchard half a mile from either of the other orchards examined. We did not see the owner and have no further information about this orchard.

10. Was on farm No. 3, belonging to Mr. J. D. Wigle, about one mile and a half from occurrence, No. 9. We found the scale quite prevalent in this orchard. Some of the trees planted here were bought from the same dealer as those on farm No. 2, and were planted the same year. It is probable that every orchard in this immediate vicinity is affected. Mr. Wigle noticed that many of his trees were not doing well but could not discover what the trouble was until he found the fruit covered with the scale.

11. Was an orchard near Niagara-on-the-Lake. The owner was not at home, and I could not get any information as to the source of infestation.

12. Was on orchard of about three hundred peach trees, located alongside occurrence No. 11, many of them badly infested. I could not get any information about this orchard as the owner was absent from the country.

We view with great anxiety the introduction of this most dreaded of all fruit pests into our country. We are surprised and alarmed at the extent to which it has already spread, and the serious damage done. Although it was thought two years ago that this scale could not exist in our country, and that we had nothing to fear from it, it now appears that the climatic conditions are favorable. That we are in its life zone is proved by the rapidity with which it has multiplied in infested sections. Not only are our orchards and our vineyards in danger of destruction but our forests also, except only conifers, pines and cedars. If unchecked there is no question but that it would soon overrun the country destroying all deciduous trees and plants and causing a loss of millions of dollars.

We do not know what extent of country is liable to be infested with the scale. It has already overrun the bounds assigned it by some leading entomologists in the United States. We have found it flourishing where it had withstood a temperature of twenty degrees below zero. And Professor L. R. Taft, Horticulturist of the Agricultural College, Michigan, informed me that it had successfully withstood a temperature of from twenty to twenty-five degrees below zero in Michigan.

As to the natural enemies of the scale, as already noted, Professor Webster says there are none of any practical service. The only treatment that has been effectual in very case is burning. Whale oil soap solution has failed in some cases. Hydrocyanic acid gas has not been altogether satisfactory. Some have reported satisfactory results

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from the use of pure kerosene. Others have used it with partial success, but killed numbers of their trees. Our experience is limited and reports of results of the different treatments in other localities are conflicting. There appears to be different results in different localities from similar treatment.

Professor L. O. Howard, of the United States Department of Agriculture, Washington, says that the scale still exists in nurseries and orchards in nearly all the States where it has been located, and there is little or no doubt that its dissemination is constantly going on, and it is doubtful if it can ever be stamped out where it has been thoroughly established. It is therefore impossible to say that the scale is completely exterminated from any orchard or nursery until a number of years have elapsed.

We know that many American nurseries are infested and for our own protection we should have legislation authorizing the thorough inspection, and if necessary the treating and quarantining of all nursery stock and fruit coming into the country, whether accompanied by a certificate of inspection or not. We have been receiving from the United States fruit infested with the scale for the past ten years, and nursery stock for four or five years.

We found California pears this season in Toronto and London infested with the scale, which might easily have been communicated to some tree or plant. They have laws requiring strict inspection of our nursery stock and fruit entering their State. They have guarded their interests, while we have neglected ours.

If we are going to exterminate the scale from the Province, and it should be done at any cost, it will take a considerable sum. A number of inspectors will have to be put at work at the earliest possible date. In each township in the fruit district there should be a man at work by January. He should have authority to destroy infested trees at once. If this is not practicable the trees should be marked and arrangements made for their destruction not later than the 20th of April, for as soon as warm weather comes the young insects will be running, and the infestation is sure to spread, not only in the home orchard, but it may be carried by insects and birds to orchards a mile or more distant.

As it is for the public good that this pest should be stamped out, some compensation should be made to the owners of trees destroyed.

The State of Massachusetts has spent seven hundred thousand dollars in the past five years in endeavouring to exterminate the gipsy moth. The area infested is now much less than it was, but the commission appointed to deal with it ask for two hundred thousand dollars for next year, and estimate that it will cost over a million dollars more to rid the State of the pest. From eighty to three hundred men are engaged in this work throughout the year.

We found a few specimens of plum lycanum in almost every orchard that we examined south and west of Toronto. It is easily distinguished from the San José Scale. It is unarmoured and may be compared in appearance to half a brown pea attached to the underside of the limbs. It does not seem to flourish in this country. Although we had St. Lawrence plum trees badly infested with them ten years ago they have been controlled by spraying with kerosene emulsion in April.

Every fruit grower should have a pocket lense, which can be procured at from fifty to seventy-five cents. Trees should be examined, especially those planted within the last five years, giving special attention to those that are not doing well. The San José Scale can be identified by its being armoured round, and having the surface of the tender bark or fruit discolored reddish or purple.

To the surprise of every one, this minute, wingless, silent enemy of fruit growers has spread from the Rocky Mountains to the Atlantic Ocean inside of five years, and now covers the continent from ocean to ocean. Frost and drought, fire and flood are not to be compared to it. They come and go, but it has come to stay, unless drastic measures are taken to exterminate it.

INSECTS AND SPRAYING.

Dr. James Fletcher, Dominion Entomologist, then addressed the Association as follows :

" Mr. Orr's very able and admirable report of this infestation in Ontario is very complete. All I can do is to draw your attention to some of the dangers in regard to this infestation, and to warn you against taking as gospel some of the late writings of certain specialists in the United States who have studied this insect. The most dangerous reports which have appeared are by two leading men there who have lately stated that this is not such a serious insect as it was supposed to be. Now, don't for your own sakes believe that. The San Jose scale is without comparison the most serious pest which has ever occurred in Canadian orchards. If you want to confirm this for yourselves, you have only to visit some of those orchards which Mr. Orr has mentioned. In the orchard of Mr. Thonger there were a great many trees so thoroughly covered with the scale last spring that, notwithstanding any treatment he might have applied or any method he might have used to eradicate the pest, those trees would have died. At the same time, notwithstanding his careful and constant attention, the scale has spread, as he has told us, through a large part of his orchard during this summer. Another dangerous statement—not for entomologists, but for farmers—is this: That this scale does not spread very rapidly. Now, the experience of Mr. Thonger tells us that practically it does spread very rapidly. An infested tree becomes seriously infested during the summer in which it is first infested, but does not spread very rapidly compared with some other insects. We find, however, that one infested tree becomes a very serious source of infestation to other trees; it becomes almost useless itself in the second season. It has been calculated that this insect will kill a vigorous tree in three or four years. It is not as much at home here as in California and, therefore, the fatality to the trees has not been so rapid. With regard to treating trees, there are three methods advised: (1) Total eradication—dig up the tree and burn it; (2) Treatment with soap mixtures; and (3) Treatment with gas. But it must be borne in mind and should have very great emphasis laid upon it, that a tree once seriously infested can never be sound again—never be a profitable tree for you to save and keep in your orchards; Mr. Thonger's method of cleaning his trees with a broom or brush, which has been referred to, is a very dangerous thing to make public. It looks to be so effective that many people who will not take the great care Mr. Thonger does and follow up with a thorough spraying, might adopt it, but it is utterly impossible to brush a tree on all its little twigs where these scales spread to; and if you shelter yourself behind the assumption that you have cleaned the tree, when you have only half done it, you have left your work in just as bad a condition as it can be for the scale to go on and destroy other trees; for, if you left it alone, the tree would have been killed by the scale and would have been taken out as a consequence, but if you save it, it will go on spreading the infestation, and that is why I think this is a dangerous method. Although it appears to be effective, it is most ineffective, because it will leave enough scales alive to do a great deal of harm. With regard to the life history, it is not worth while telling you the details. It behooves everyone of you to say to everyone you come in contact with that this is a serious pest and that we have to fight against it and to do it now. Now, whatever condition our bill may be left in when it comes through the Legislature, the very fact that your Minister has prepared that bill should make every fruit grower in this country recognize that he is doing all he can to help you in this matter. When the first scare arose in 1894, as a warning to fruit growers I used up several pages of my report in telling fruit growers to wake up, that the scale would most probably come here, and, if so, it would do them a great deal of harm. Now, it is an important matter to find out whether a scale found in an orchard is really the San Jose scale or not, because there are some other scales that are so nearly like it that it takes a specialist to distinguish them under a compound microscope. I do not mean the ordinary lens or magnifying glass; a microscope is a much stronger instrument with which small bodies are examined, and a special instrument is necessary to tell whether this is the San Jose scale or not. Now, don't suppose that because you find a scale in great abundance on

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your trees that, therefore, necessarily you have this insect. In the orchard of Mr. Hendershott, near St. Davids, there was a scale that was said at once by some persons to be the San Jose scale because it covered the whole tree. It is necessary to understand the life histories of insects. One of the peculiarities of scale insects is that you may find a single tree very seriously infested even unto death, and yet the species does not spread to other trees around it. That was the case in Mr. Hendershott's orchard. The trees were killed because they were standing beside the fence where they got no cultivation, no encouragement to make a healthy growth. The consequence was that being in a feeble condition the scale attacked them so seriously that they died. If that man's orchard had been condemned and he had been obliged to destroy a great many trees, there would have been useless loss. It was not the San Jose scale, but it was one that could be scarcely told from it except by microscopical examination. Such examination was made, and in confirmation, instead of that orchard being infested at this end of the season, it is perfectly clean, and some of the few scales which were on the other trees have been destroyed by their natural parasites. I only want to emphasize that it is important to identify the scale exactly. Now, you have not time and it is not advisable for you fruit growers to get microscopes and examine these matters for yourself. Why should you? You have your government officials that are being paid for doing these things. You have simply to send specimens to Guelph or Ottawa and get a report on them that will relieve your anxiety, or tell you whether or not you must take special measures to eradicate the insect. It is most important to know what the insect is. Here is a piece of one of the peach trees taken from Mr. Van Horn's orchard. He thought he had his orchard entirely clean of this insect, and he sent me some twigs from the trees on which there were a few of the Forbes scale, but on the same twigs there were just two of the true San Jose scale, so he found that he had not quite cleaned out his orchard, and all his trouble will have to be taken again ere this orchard is clear. Mr. Orr found other trees. Mr. Van Horn is a man who has shown that he has great energy and is very public spirited. The moment he found there was the slightest chance of this being the San Jose scale he sent off specimens to be examined. Directly he was told that they were, he asked for the proper remedy and at once applied it, and as a consequence the scale has been almost entirely eradicated. An orchard near his, his son-in-law's, which was infested from a single tree sent by him from the same consignment, has not yet been examined, but probably will be found in the same state as Mr. Van Horn's. Another danger. Sometimes, as Mr. Orr has told you, this insect attacks a great many different kinds of trees and shrubs. It also attacks a great many kinds of timber trees. The subject for discussion is the San Jose scale and how we can know it. It is an exceedingly difficult matter for you as fruit growers, and I would not advise you to worry yourselves or to waste your time looking through the microscope to find out whether it is the scale or not. Put it in an envelope and send it to one of the sources of reference you have, and you will get information you can rely on; but there are one or two rule-of-thumb methods by which you can at any rate come to some sort of understanding yourselves as to whether it is the San Jose scale or not. One of the characteristic effects of the San Jose scale on the young green wood is a very decided reddening or purpling of the tissues beneath the bark—you will find traces of it, particularly in the pear. (The speaker here broke the twig he was holding and passed it around to illustrate this point.) Then you may lose some time in deciding whether the large scales on the young wood are the San Jose scale, the same as the small ones. I have told you that you may find two or three different kinds of scales on the same wood, but these female San Jose scales that get onto the young wood appear very much larger than those that are lower down on the twigs. The other danger that I refer to is this, that as this insect attacks a great many different kinds of trees, it means that every cemetery, every ornamental ground, every garden in the country, as well as the orchards of the fruit growers, are liable to be destroyed by this insect if it increases and nature does not provide some remedy against it. Now, in cleaning out an orchard it is not at all an unusual practice either in the United States or here in Canada to overlook smaller shrubs that are growing beneath infested trees. I have here a piece of currant bush grown in one of the infested Canadian orchards, and the bushes were almost as badly infested as the trees were. Now, suppose these trees had all been eradicated and the bushes left, the trees subsequently planted

would be infested from the bushes, if you will examine that twig you will see what an exceedingly easy matter it would be to overlook the scale. You will also see on the twig many other objects that are frequently mistaken for the San Jose scale. Not only are there scales that resemble the San Jose scale so closely that it can be decided what they are only by microscopic examination of what may be called the "animal" beneath the scale, but there are many things that look like scales and which are not. There are some corky objects or organs upon the bark of many trees or shrubs that are known by the name of lenticels. I will give you a rough and ready way of telling whether suspicious objects found are lenticels or scales, namely, push them gently with your nail; if they are scales they will be moved off very easily; if, on the other hand, they are lenticels, you will have to tear the tissue of the bark to remove them. I have had, during the last year, a great many different objects sent in to me to know if they were the San Jose scale, and, although I knew that many fruit growers and people who don't study entomology very closely had rather vague ideas about what insects were, I was rather surprised to find large caterpillars and spiders and beetles sent in to know if they were the San Jose scale. (Laughter.) But I do not mention this to discourage such sendings. Find out all you can. It shows a demand for knowledge on this subject by the people who are interested, and that is just what we want to stir up. Now some of you gentlemen may have thought yesterday morning that I rather scolded in talking about the neglect of spraying. You may think what you like of me—that I scold you, or anything you like—but do spray your trees if you want to save your money. It is not only saving seventy per cent. of your fruit, it is saving seventy cents out of every dollar, and that is what we want to do. That is why I keep on—line upon line, precept upon precept. That is why Mr. Orr keeps at it with his reports from year to year; that is why the Entomological Society keeps on year after year advising, Spray, spray, spray! But it must be acknowledged that the fruit growers do not seem to see the importance of this information. How much discussion on insects did you have last year? Not a minute. Nobody, apparently, thought that fruit growers were interested in insects at the last annual meeting of this society; there was nothing asked about insects, but yet it was one of the worst seasons for insect injuries that we have had for many years. Now, gentlemen, I tell you *you* are interested in insects. You have about one hundred different insects that attack your various crops every year. Out of that one hundred, about ninety-five have been sufficiently studied for specialists to give you a remedy which will save you a large proportion of your loss; therefore, if you have not got time to make money, you are a peculiar class of people; and knowing about these things generally enables you to find time. Just one word more while I think of it. Mr. Orr spoke of the San Jose scale as an armored scale. Now, you may wonder what an armored scale is, because it is just another of those descriptive words that the entomologist uses for his own edification. An armored scale in contrast with an unarmored scale is an insect which covers itself with a separate scale in the same way as the Oyster-shell Barklouse. A short time after the young scale hatches it comes to rest and then secretes from its body a waxy protecting scale. This makes it impervious to many treatments. The New York plum scale belongs to another class, the brown hardened scale in this instance being really the skin of the insect, but it is almost as impervious to treatment as the others. As Mr. Orr told you, it succumbs when treated with the kerosene emulsion. The San Jose Scale has the most enormous power of multiplication. One scale may produce a family of over three thousand millions in a year. They spread over the tree upon which they are born and very soon reduce its vigor, so that it is almost impossible to save it. Why it does not spread rapidly to other trees, when it spreads so rapidly upon the tree itself, is because this insect has the power of motion for only one or, at most, two days, when it is very young, immediately after birth. Instead of going through the ordinary process of being produced from the egg, then the larva, and then to a chrysalis form, and then a perfect insect, as most insects do, the egg period is passed inside the mother insect, so the San Jose scale practically bears young alive. One female when matured—it takes about forty days for it to come to maturity—begins to produce young at the rate of from ten to fifteen in the twenty-four hours, and keeps that up for six weeks, so that there is a family of between four hundred and six hundred in the first

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brood, and when these young are forty days old, they again may produce from four hundred to six hundred, and the total of that, if you work it out, you will find comes by the end of the season to thirty-two hundred millions. Now, that is an enormous family.

A DELEGATE : Do they produce that many in a year ?

Mr. FLETCHER : Yes ; in one year there are four or five broods, according to climate ; in Georgia and the Southern States there are probably six broods ; in Canada there are probably four broods, because the young begin to appear about the middle of June—certainly not sooner than the middle of June—but they breed from the middle of June until the frost comes. On boughs of infested wood sent to my office in the first week in September, when they became warm, the young insects came out of the scales and I examined them. The question may be asked how do these minute creatures, so small that they have been likened to grains of powdered sulphur, get from tree to tree. It has been discovered that they are carried by the wind, by other insects and by birds. There are many instances where the scales have appeared first close to a bird's nest or on the top branches of trees, showing they had been carried there by birds, and we know they are carried by other insects. There is nothing remarkable in this. We know that some insects can only get to their proper places of breeding by the help of other insects. The blister beetles, which are parasites of bees, can only get into the bee hives or the different nests of wild bees by being carried on the bees to those nests. The small eggs are laid in flowers, and when the flowers are visited by the bees, the larvæ, which can live for several days before they get any food at all, by instinct attach themselves to the bees and are carried to the nest. These little insects, the minute a bee comes near them, attach themselves to it and are carried to the nest. Similarly, the young San Jose scale larvæ mount upon birds or other insects which visit the tree where they are born and are by this means transported to other trees or plants. So there is every danger that this pest will spread widely from orchard to orchard every summer. Every infested tree will become a centre of infestation, and now is our only chance to fight it—we must fight it at once and as hard as we can ; and, therefore, I will merely add a word or two more to what Mr. Orr has said as to this great danger. Lately there have appeared in newspapers some statements which are calculated to do much harm, namely : that the San Jose scale is only an ordinary injurious insect similar to many others which we have had to fight against. In answer to this, I assure you this is entirely wrong, for it is by far the worst pest we have ever had to deal with. If you don't believe me, go to one of the infested orchards and see for yourself. But notwithstanding the gravity of the case, it is not hopeless if all concerned will do their best in helping to control it and to prevent further introductions. Nature in time provides a natural check on the increase of insects which occasionally appear in enormous numbers. This has been to a large extent the case in parts of California. I had a letter from one of the fruit inspectors in California who says, "I see you have the San Jose scale in Canada. With us it is not now a pest at all." And yet we know it was so there a few years ago, and it destroyed whole orchards. Then we may look forward hopefully to such a state of affairs here in the East. It is not a matter to be too much discouraged about, because we know we can all do something for it, and in time it will probably disappear ; but unfortunately we do not know how long it will take, and it may ruin us while we are waiting, so we must not trust to that. Mr. Burrell, in his observations at St. Catharines, has found a few specimens of two parasites of the scale and brought them to-day. These are both lady-bird beetles—one very small, which is a valuable parasite, and the other is the Twice-stabbed Lady-bird, which is abundant in some orchards, and probably is the cause of Mr. Hendershott's orchard being cleaned of the Forbes scales since last spring. They were there, but now we can hardly find any specimens.

There is another very important matter that has been touched upon. It is important to us because a great many fruit men will try it and may damage their trees. I refer to spraying with pure kerosene oil. Now, this recommendation of spraying with pure kerosene oil I do not endorse. I have seen good results from it, but I have also seen disastrous results, and though it is strongly recommended by Prof. Smith of New Jersey, one of our leading economic entomologists, and has been confirmed by

work done in the United States division of entomology at Washington, at the same time I say the results are such that it is not wise for us yet to adopt the remedy. There are from time to time new remedies coming to the surface in this work of fighting insects, but we must be cautious in adopting new methods. A few years ago a material was very highly recommended by some entomologist for fighting the canker-worm, and some fruit growers destroyed dozens of trees by using it. Therefore, let us wait before trying these new remedies, and I would recommend you for the present not to use the pure kerosene. If you like to do it, you may get good results, but I will have nothing to do with it till I get better results than I have in the few experiments I have tried. What then can we do? Is there any remedy for the scale? It is not a question of doing something, but what is the best remedy? The best treatment so far as I can find from my experiments is to spray the trees in the autumn with the kerosene emulsion—the mixture of two gallons of coal oil with one gallon of soap suds, churning these together till it is of a creamy nature, which takes five minutes, and then mix that with from four to six times its quantity of water. This should be sprayed over the trees as soon as the leaves fall; and then in the spring before the new growth begins these same trees are to be sprayed with soft soap or fish oil soap made with potash so that it will remain liquid, and of the strength of two pounds in one gallon of water. Now remember the strength. Mr. Thonger's experiments were spoken of and it was stated that he had tried the whale oil soap specially, but he didn't get the best results because he used a mixture which did not contain enough soap. He used one pound in five gallons. You must follow the recipe if you want the results. Mr. Thonger was experimenting when he used a weaker solution more frequently to get the same results. He found that he did not get them, and we are told distinctly in every Bulletin that has been published on this subject that two pounds of soap to one gallon of water are necessary. As a consequence, he has not cleaned out his orchard as it ought to be. It is difficult to spray the tops of trees thoroughly with mixtures, so if you want to do effective work you must prune your trees down to the lowest possible size you can without "breaking the heart of the tree," as fruit growers say. Spray your trees directly the leaves fall with the kerosene emulsion. During the winter prune them down, and then in the spring spray them again with the whale oil or fish oil soap. Whale oil soap is much more expensive in Canada than in the United States, but, if the fruit growers of Ontario require large quantities they certainly can get it in the same advantageous manner as the people in the United States. The wholesale price in the United States is four cents a pound for the best potash soap that you would require to use in this work. Here, I am sorry to say, it is sometimes twenty cents, bought in small quantities, and that is why fruit growers have hesitated to go to the expense necessary; and as we have been so much fed with pap in this country by governments—in this matter, as is usually the case—we are waiting till the Government helps us. Now, gentlemen, this is not a matter for the Government to help you in at all. They may do it, but it is of free grace if they do. Every man has got to stand on his own feet and fight his own fight. Fight your own battle now. This is a very bad insect. You have had bad insects before, but you didn't go whining to the Government about them. Be men about this as you are about other parts of your work. Go ahead and find out if this is in your orchard, or not; and let me remind you that such a suicidal policy as trying to hide the fact, if you are so unfortunate as to find the scale on your trees, is not worthy of you as Canadians, for the only way to stamp out this terrible enemy is to report it promptly on discovery. You should get to work at once and find out if you have the San José scale on our trees. Send in your specimens to one who knows, to find out if you have this scale, and if you have, fight it for all you are worth.

At the conclusion of Mr. Fletcher's address the proposed San Jose Scale Bill was fully discussed. As the bill has since become law and the wishes of the Association largely met, it is unnecessary to repeat here the details of the discussion which were mainly in the form of individual opinions of the various clauses of the bill and suggestions which have been incorporated in the bill. The following resolution was passed:

Moved by A. H. PETTIT, seconded by G. E. FISHER, that a commission be appointed, consisting of the President, Mr. E. D. Smith, M. Burrell, Mr. C. C. James, and A. H. Pettit, to take into consideration the matter of the proposed Bill by the Ontario Legislature for the destruction of the San Jose Scale, and to

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more carefully consider the provisions therein contained and its connections with such legislation as may be deemed necessary to have passed by the Dominion Government to thereby cover the whole question of restricting as well as the destruction of the insect already imported, and to also proceed to Ottawa and lay it before the Minister of Agriculture for the Dominion.

All that need be given here in regard to the scale is to print the Act as finally passed and that is now in force in the Province of Ontario. It reads as follows :

AN ACT TO PREVENT THE SPREAD OF THE SAN JOSE SCALE.

HER MAJESTY, by and with the advice and consent of the Legislative Assembly of the Province of Ontario, enacts as follows :

1. This Act may be cited as *The San Jose Scale Act*.

2. In this Act the word "Minister" shall mean the Minister of Agriculture for the Province of Ontario.

The word "Plant" shall mean any tree, vine, shrub or plant, or any part of a tree, vine, shrub or plant, or the fruit of any tree, vine, shrub or plant.

The word "scale" shall mean the San Jose Scale insect in any of its stages of development.

3. No person shall import or bring, or cause to be imported or brought into the Province of Ontario, for any purpose whatsoever, any plant infested with scale.

4. No person shall keep, or have, or offer for exchange or sale, any plant infested with scale.

5. For the purpose of scientific investigation the Minister may from time to time, by writing given under his hand, except such persons as he may deem proper, from the operation of the two preceding sections, and while acting under such permission, such persons shall not be subject to the penalties imposed by this Act.

6. Any person having reason to suspect that any plant in his possession, or in his charge, or keeping, is infested with the scale shall forthwith communicate with the Minister in regard to the same, and shall furnish the Minister with all such information in regard to the source or origin of the said infestation and the extent and nature of the same as he may be able to give.

7. Whenever the scale exists, or is supposed to exist on any plant, the Minister may direct a competent person to make an examination and inspection and may order that any plant so infested, or such part as he may deem advisable, shall be immediately destroyed by burning either by the person appointed to make the inspection, or by the person owning or having possession of the said plant or some other person so directed in writing, and the person so directed shall make a full report to the Minister in writing as to the nature and extent of the work so performed, together with a fair estimate of the value of the plant destroyed.

8. For the purpose of enforcing this Act, it shall be the duty of every inspector appointed under *The Yellows and Black Knot Act* to make careful examination and inspection for the occurrence of the scale within the municipality for which he is appointed, and to report forthwith to the Minister every case of infestation, and neglect to make such report shall render the inspector liable to the penalties imposed under section 11 of this Act.

9. Any person appointed by the Minister under this Act to inspect, or to destroy any plant, for the purpose of enforcing the provisions of the Act, shall, upon producing his authority in writing, have free access to any nursery, orchard, store, storeroom, or other place where it is known, or suspected, that any plant is kept.

10. Upon the recommendation of the Minister there may be paid out of the Consolidated Revenue Fund of the Province to the owner of any plant so destroyed a sum not exceeding one-fourth of the value thereof (not including fruit) as reported upon by

such officer or other competent person, appointed as aforesaid, but nothing in this section shall apply to any plant imported into the Province within a period of one year prior to the examination by the officer aforesaid.

11. Any person neglecting to carry out the provisions of this Act, or any person offering any hindrance to the carrying out of this Act, shall, upon summary conviction, be liable to a fine of not less than \$20 nor more than \$100 together with costs, and in default of payment thereof shall be subject to imprisonment in the common goal for a period of not less than ten days nor more than thirty days.

12. The Lieutenant-Governor in Council may by order direct that other scale insects than the San Jose Scale may be included in the provisions of this Act, and thereafter during the continuance of such Order-in-Council the word "scale" in this Act shall include all such other scale insects. Public notice of such Order-in-Council shall be given by publication in two successive issues of *The Ontario Gazette*.

FURTHER HINTS ON SPRAYING.

Dr. FLETCHER, being asked to continue his talk on insects, said : At the last meeting of your Association there was very little said about injurious insects, and apparently very few questions were asked about them. Now, it is not that they are not of interest to you ; but you are mistaken in your idea that there are other things of more interest to you. Any one cause which deprives you of a large percentage of your profits every year is of very great importance to fruit growers, the same as anybody else whose business is making money ; and every year you lose much from the attacks of the same kinds of insects, which recur year after year and concerning which already practical remedies are known. A practical remedy is one which is so easy that it can be applied without fear of making mistakes—is yet effective, so as to carry out the work that you propose to do with it—and at the same time does not cost too much, in fact, does not cost more than it is worth ; and if you have a remedy which meets all these requirements you then have a practical remedy. Then, I say, you have practical remedies already known and worked out for most of the insects which attack your crops. I have found that the insect each man considers the worst in the country is the one that he suffers from. There are some of frequent occurrence that it may be well to speak of. We have spoken a good deal about spraying in this meeting, and I think you are all pretty well persuaded that spraying is a good practice. Bulletins are appearing from time to time giving the results of this spraying work, and in Mr. Orr's concise report you find evidence that it paid very well indeed those fruit growers in whose orchards he sprayed, to have their trees treated—so much so, that some of them said, if they had sprayed their whole orchard, they would have made a very great saving this year. I know such has been the result of spraying in nearly every instance where it has been practised carefully and with proper materials. Now in spraying it is practically of just as much importance to use a proper instrument as it is to use the proper materials ; therefore you must have a good spray pump ; and I would advise you all in looking for a spray pump, instead of looking for the lowest priced ones first, begin at the top, at the highest priced, and work down till you come to the one that you can afford. There is no such false economy as buying a cheap pump or trying to do this work cheaply, and the saving that you make in a few dollars originally expended in buying a pump is only comparable with that very foolish but very frequently practised economy—or false economy—of buying cheap seeds. I have a great number of seeds submitted to me every year for examination, of the different clovers, and quite recently I had a sample of two large purchases which had been made of alsike seed. Now, the difference between the prices of these seeds was two cents a pound, and when you buy one pound the difference between seven and a half cents and nine and a half cents seems a good deal ; but when you remember that you only want from six to eight pounds for a whole acre, you see what a foolish economy it is, for in saving twelve cents you may lose many times as many dollars in the crop you reap and subsequent labor in eradicating weeds. So with spraying. In buying a cheap spray pump you may not

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only provide yourself with what will provoke a great deal of bad temper and perhaps some bad language, but you will not save what you intended—a paying percentage of your crops. Now, there are a great many spray pumps, and there is only one shown here to-day—and I may say it is a good pump. You will do better to pay an extra dollar or two for the bearings, and such parts as are likely to be subjected to the corrosive effects of copper mixtures, to be made of brass, because it is a small initial cost but a very great improvement and a saving in the life-time of the pump sometimes of three or four years. Now, then, having a good pump and nozzle, to get good work we must use the proper materials. Get rid of the idea, which is so prevalent that it has to be mentioned at meetings like this, that Paris green is a panacea for all the ills in the way of insects. It is perhaps needless for me to remind you that the different kinds of insects may be all divided into two classes, in accordance with the way in which they eat their food—and their food is our crops. The first class consists of those which have, as we have, mandibles, with which they bite the substance of their food—the leaves or fruits which they eat. The second class includes those insects, which, instead of jaws, have their mouth parts modified into a small tube with which they suck out the liquid contents of plants—the sap, as we say—and leave the plant depleted of the sap which is necessary, and so the plant dies. But the practical application of this knowledge is, that these two classes of insects must be treated in two different ways. Those which eat their food can be treated by the application of any poisonous material to the surface of the food, while the others must be treated with some material or substance which kills them by simply coming in contact with their bodies. There are suitable remedies for both of these classes. There are also a great many different kinds of injurious insects which have attacked fruit crops during the past season, for which practical remedies are known. I will not take up your time now by speaking of all of these, but will merely speak of some of the worst. All insects have been given names, so that when the names are once known you can recognize the insect again. The most serious pests which attack your fruits every year do not exceed 120 in number, therefore it is only a matter of learning the names of about 120 insects. One of the worst which you have to fight against every year is the Codling Moth. I will speak of that one. Now, the usual practice, and the best remedy for the Codling Moth is to spray your orchards as soon as the apples have formed. The practice of spraying them during the time flowers are out is not only injurious to bees, but it is foolish and wasteful as far as the fruit grower is concerned. It was thought at one time—we are gradually getting more information about all these things—that the eggs of the Codling Moth, were laid inside the flower. We now know from accurate observations that the egg is laid on the side of the apple, and that the young caterpillar, after hatching, eats its way into the apple through the calyx end. Knowing the life history of an insect is the secret key with which we unlock all the necessary information for the application of remedies from which we are to get good results. The Plum Curculio, one of the frequently-recurring insect pests, is best treated with the Paris green spray—and there is a general recipe for Paris green spraying, which is applicable to all plants upon which it is necessary to spray this poison, and that is, one pound of Paris green and one pound of fresh lime in 200 gallons of water. If you make the mixture stronger you will certainly burn some delicate foliage, and if you make it weaker you will not kill some insects. Those who have had experience find that this mixture can be safely used on peach trees if mixed in that way. The curculio here attacks your peaches, your plums particularly, and also in some districts the apple. Spraying with Paris green is the best remedy which has yet been tried for this injurious insect. An insect which has done a great deal of harm in the past is known as the Cigar Case-bearer. It is one of the small caterpillars that builds a case around itself, and from the resemblance of this case to a miniature cigar it was first called the Cigar-shaped Case-bearer, but that name has been contracted down to Cigar Case-bearer. As much as possible we always use the same popular name for the same insect, because frequent applications for information are made, and if the insect is not spoken of under the proper name it is impossible to give the proper remedy. This insect has been treated very satisfactorily by Mr. Harold Jones, of Maitland, by spraying his trees, just at the time the young insects move out on to the young buds, with kerosene emulsion. This mixture of kerosene and soap is a very fatal

insecticide for all insects upon which it falls. It runs over the body and closes up the breathing pores—insects do not breathe through their mouths as we do, but through breathing pores along their sides, and a drop of oil placed on an insect is a very much speedier way of killing it than cutting its head off, because its head is only of use to it for eating its food, and for biting sometimes. Another insect which is doing a great deal of harm in Western Ontario now, is the Oyster-shell Bark louse—a bark louse not in the least similar in appearance, nor indeed in life history, to the San Jose scale. While the San Jose scale is viviparous, bearing its young fully formed to go out at once and begin their life, the Oyster-shell Bark louse only lives apparently for a short time, and for the rest of the year appears on our trees, as it does now, in the shape of a waxy scale, covering a mass of white eggs. These eggs hatch at one time of the year, in this part of Canada probably from the 25th June till about the 4th or 5th July. There are two methods of treatment for this insect which are effective. One is the spraying of the trees with kerosene emulsion during the winter or about the beginning of July, when the young are moving about on the twigs. If it were possible to reach every insect with the spray, the summer application would be the best, but unfortunately the leaves are so thick at that time of year that I think the most effective treatment is in the spring before the leaves open, when the trees may be sprayed with the kerosene emulsion and very good results secured. At the same time we know that this insect, perhaps more than any other, attacks weakened trees; therefore, if you find trees badly infested with the Oyster-shell Bark-louse, the first thing to do is, if your orchard is in grass, plow up the grass, cultivate the land, and fertilize the trees so as to give them renewed vigor to throw off the attacks of its enemies, and then apply your remedies for the insect, to destroy it from the trees.

Mr. BURRELL: What is the strength of kerosene emulsion in the winter for Oyster-shell Bark-louse.

Dr. FLETCHER: One to nine—the standard Riley-Hubbard formula. The tent caterpillars have been very abundant and injurious all through Canada during the past year. In British Columbia they were a perfect plague. Through the Northwest Territories and Manitoba alike they were destructive to all shrubs that were liable to their attacks. In Ontario it has been injurious in this part of the Province on orchard trees as well as in Nova Scotia. In the Ottawa district, for miles along the Ottawa river, groves of aspens have been stripped of every vestige of leaf, and serious injury has been done in the ornamental grounds at Ottawa. Now, I have very little sympathy for any one who lets the tent caterpillar destroy his trees. The life-history is well known. The eggs are laid about mid-summer, and in a very few weeks the young caterpillars are formed inside the eggs—they can be found there now fully formed; but they do not emerge from the eggs till May, and then for some time after they have emerged they are very conspicuous in the orchards by reason of their silvery-white tents, which can be very easily picked off by any one who sees them on his trees. Again, during the winter the eggs are very conspicuous, and those who have once learned to recognize them find them easily, and they can be hand-picked from the trees in the same way that the nests containing hundreds of young caterpillars are in the spring. If these precautions have been neglected, the ordinary spraying which should be applied to all fruit trees year after year, of Paris green and Bordeaux mixture, to kill leaf-eating insects and fungous diseases in the spring, will equally well destroy the tent caterpillars. I do not think of any other widespread pests, which during the last season have been troublesome, but if for a few minutes you will ask questions concerning any particular insects I will answer you shortly, giving the best remedies for those you want to know most about.

Some pests have been very abundant in some sections, but they have decreased in numbers at other places, and the ordinary infestation of cut worms and canker worms, bud moth, cigar case-bearer, insects that we have year after year, have all succumbed to well known methods. I need not tell you that if you want information about these insects I shall be delighted to help you all I can if you let me know your wants.

A DELEGATE: Canker-worm?

Dr. FLETCHER: is allowed green as very sudden but they have noticed that if an orchard again infested from orchard caterpillar the whole green early sprayed with worm. A some parts impossible fashioned and castor is the best

Rev. I.

Dr. FLETCHER: the looper caterpillar of the green. This occurs.

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Mr. TAYLOR:

Dr. FLETCHER: the webs discovered by growers present small caterpillars, not present considerably by growers

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Dr. FLETCHER: found by Dr. them this year do they not

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Dr. FLETCHER: the winter information.

Mr. JON: introduced in

Dr. FLETCHER: The canker-worm is very hard to fight, because we find that if it is allowed to grow more than half its size it is not so susceptible to injury from Paris green as many other insects. When canker-worms infest an orchard they never appear very suddenly. Sometimes you notice them only after they have multiplied enormously, but they have by that time been some years in the orchard, although you have not noticed them. The female moths have no wings and consequently cannot fly. Therefore, if an orchard is thoroughly cleared of this pest it must take some time before it can be again infested. The females are spider-like creatures which run fast and are easily carried from orchard to orchard on farm implements, etc., and one batch of eggs will give enough caterpillars to start an attack, which, if not controlled, might end in the defoliation of the whole orchard. The best remedy where the trees are small is spraying with Paris green early in the spring, directly after the flowers have dropped; and, if the trees are sprayed with Paris green and Bordeaux mixture, that is the best remedy for canker-worm. Along the shores of Lake Erie, where there are some very large trees, and in some parts of Nova Scotia where trees have been planted very close together, it is impossible to spray them on account of their closeness and of their size; then the old-fashioned method of painting on the trees a mixture of printer's ink and oil, or resin and castor oil, as explained in my annual reports, which are at everybody's disposal, is the best remedy.

Rev. Mr. ANDREWS: The same caterpillar was on the raspberry the last few years.

Dr. FLETCHER: There are two caterpillars which attack raspberries; one is known as the looper on account of the way it walks, and the other, which is hairy, is the caterpillar of the Raspberry Saw-fly. Both of these are easily treated with hellebore or Paris green. The Paris green may be used, because the fruit is not formed when the caterpillars occur.

Mr. TYE: One caterpillar is a small one which covers the whole limb with a web as it eats, and the other one clears the leaves of the tree off as they go.

Dr. FLETCHER: What tree?

Mr. TYE: Every tree.

Dr. FLETCHER: You probably refer to the red-necked caterpillar of the apple—the remedy is to cut off the bough, bearing from 150 to 200 caterpillars. The first one—with the web—is probably the tent caterpillar that I spoke of?

Mr. TYE: No, it is quite small and brown; it will cover half a limb over as it goes.

Dr. FLETCHER: Then it may be the Fall Web-worm. Paris green, or cutting off the webs directly they appear, are the best remedies. I should like to ask the fruit growers present if they have noticed, during the past summer, injury to grapes by a very small caterpillar which attacked grapes, webbed them together, and ate out the contents, not particularly injuring their appearance, but injuring them for the consumer considerably? I found them in grapes from the whole Niagara district. Was it noticed by growers here?

Mr. McNEILL: An occasional one—perhaps four or five in twenty acres.

Dr. FLETCHER: I don't know any remedy to suggest, because it is too rare. It was found by Dr. Saunders many years ago, and has not occurred very much, but I noticed them this year for the first time. The grapes, I fancy, remain hanging on the bunches, do they not?

Mr. McNEILL: Yes, and are looped together in a way.

Dr. FLETCHER: The caterpillar, when full grown, drops from the grape and passes the winter in the chrysalis state. I don't know of any remedy and merely ask for information.

Mr. JONES: I know of a small green worm, about half an inch in length, recently introduced into Canada. It eats right into the side of the apple when the fruit is green.

Dr. FLETCHER : It grows an inch longer before it is full grown. Mr. Woolverton sent me one specimen, but it is not at all of common occurrence. Spraying with Paris green is the remedy which has been used in the State of New York.

Mr. DERMOTT : Is the plum borer the same thing as the peach borer ?

Dr. FLETCHER : No, it is not the same. The plum boarer is the larva of one of the bronze Buprestis beetles. The peach borer is the caterpillar of a moth. The remedies for both are the same, though.

Mr. TWEEDLE : What do you call the insect that gouges the young apples and pears with holes ?

Dr. FLETCHER : That probably may be the same insect that Mr. Jones asked about—the green caterpillar of a gray moth that comes out late in the autumn, the Gray Pinion is the English name of it—or, on the other hand, it may be a beetle. There is a beetle that gouges plums as you describe and cuts a crescent much larger than the Plum Curculio. Most of these insects work early in the morning.

Mr. TWEEDLE : We hunted in vain for that in the day time, and a neighbor suggested to look for them just at dusk. It is a green worm about five-eighths of an inch long.

Dr. FLETCHER : I have generally found these caterpillars early in the morning—probably they feed all night.

Mr. DERMOTT : Is there any better method of destroying peach borers than just digging them out ?

Dr. FLETCHER : Mr. Martin Burrell has made a careful study of the peach borer during the past summer. I don't know, as far as my own experience goes, which is very limited, that there is a much better remedy ; but he has been trying some washes during the past summer. The wash that I have recommended is the Saunders wash, made with ordinary soft soap diluted with a saturated solution of washing soda, and in that about two ounces of carbolic acid may be used to the gallon. So that it is a carbolized soap wash.

Mr. DERMOTT : Would that be a preventive, or a cure ?

Dr. FLETCHER : A preventive—its object is to keep the insects from laying eggs on the tree.

Rev. Mr. ANDREWS : When should that be applied ?

Dr. FLETCHER : That depends on the time the peach borer begins to lay eggs in this district, at any rate soon after midsummer, and it should be kept on for the later months of the season.

Mr. BURRELL : No experiments are satisfactory unless they have been carried out for a good length of time. There is this much about the peach borer : any application that does not stop on the trees for a considerable length of time is practically no good, because we have ascertained beyond any doubt that the peach borer moth does not commence laying its eggs until—at least in our orchard—July 15th to 20th ; so that if the borers are all cleaned out of the trees you would be perfectly safe in applying your washes then. But then the moth would keep on emerging right on from that time till the end of October. Prof. Smith, of New Jersey, says early in October is as late as they fly, but I find them to the end of October, so that if the wash won't stop on the tree till the end of October it is no good. The only wash that is able to do that is the wash recommended to me by Prof. Smith, composed of ordinary cement and skim milk ; and this wash, when we applied it about the 15th July or earlier than that, was almost as good in the middle of September as it was when I applied it ; and, although in our experimental part we do not have enough borers to make a test case, Prof. Smith tells me it has been satisfactory to him, and I would rather have it than any other wash. Prof. Langton has come to the conclusion that most washes are not satisfactory, although the coal tar one has been very good with him ; but the main thing is that no eggs are laid before

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the 15th July, and that they are continually laid from that until October, so that the war would have to be carried on all the time.

Mr. ORR : I would like to ask Prof. Taft what is his opinion in regard to the San Jose Scale—whether it is advisable to treat it, or destroy it at once ; what his experience has been in Michigan ?

Prof. TAFT : I agree entirely with the remarks made this afternoon, that if a tree is badly infested it will not pay to try to save it ; at once cut it out and burn it. On the other hand, a small, valuable and healthy tree I would attempt to save by spraying ; and our law provides for that. It says that the inspectors shall either order the trees to be effectually sprayed or destroyed. That was based on our experience in spraying. It has, of course, to be thoroughly done, and it will take at least two applications to make anything reasonably sure of it.

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Mr. BURRELL : What do you spray with ?

Prof. TAFT : I have used generally for the first spraying the kerosene emulsion made with a large quantity of whale-oil soap, about one part of kerosene and four of water.

Prof. FLETCHER : That is a winter wash ?

Prof. TAFT : Yes ; I am speaking now entirely of winter washes. Following that I have used the whale-oil soap applied hot, at the strength of two pounds to the gallon of water, and have seen no great difference, I tried them both side by side, and they seemed about equally effectual. As Prof. Fletcher says, if we spray thoroughly, and can reach all of the insects, it is just as easy to kill the hundredth one as it is the ninety-nine ; but it does require very careful, thorough spraying, and it is impossible to spray a large tree effectively.

Mr. ORR : Would you head the trees in before treating ?

Prof. TAFT : Yes, I always practise that—head in and thin out ; take out all the branches that I think can be spared from the tree, and thus of course reduce the surface to be sprayed as well as to give it a better chance to spray what remains ; and in cutting back large trees, in case of the peach and apple I have cut both so as to leave nearly odd stubs to the arms, and in that way only can we expect to spray thoroughly and effectually.

Mr. ORR : What is your summer treatment ?

Prof. TAFT : We have not done anything, because we have only found about four orchards where we attempted to save the trees at all. In the other cases there were only one or two trees in the place, and we thought it best to take them out, root and branch, and burn them. At the end of our spraying examinations we had remaining, growing, only about four orchards that had any scale on, and those were cut back and sprayed, and we found practically no scale—not enough to spray at that time. We found recently on one or two places a few scattered scale, and they would be sprayed, and we hoped to clean them out, but when we would have sprayed in the summer time we found nothing.

Mr. TWEEDLE : Did you cut the trees in the summer ?

Prof. TAFT : We did not find anything to spray.

Mr. TWEEDLE : How would the trees stand it by cutting them back ?

Prof. TAFT : In the case of the peach they would be injured, but I think it was during March and April they were cut back, and our spraying was done then too.

Mr. BURRELL : This spraying was kerosene, one to four ?

Prof. TAFT : Yes, using whale-oil soap instead of hard soap. I had soap made by Goode of Philadelphia, that is potash fish-oil soap that was sold at a cost of three and a half cents a pound, and in preparing this we made the water practically boiling, and dissolved the soap, and used at the rate of what would be finally a pound of soap to five gallons of water, and then added our kerosene at the rate of a gallon to four gallons and

applied it as warm as it was at the time. We had to use gloves, in fact, to handle the spray rods. It was probably 160° to 170°.

The CHAIRMAN: A question has been handed in—"What is the value of dried moss in packing fruit for export, such as can be got from Welland County?" Has any one any experience or knowledge of this matter?

Mr. BURRELL: I have heard of some person in Toronto sending some pears to England packed in that way, and with good success. Prof. Robertson spoke about it yesterday; I asked him that question. It is a great absorbent—very, very dry, and I suppose it is the same thing as sphagnum—peat moss—which Prof. Robertson explained is a very strong absorbent, and also it kept heat in, and he thought it would be a good thing in an ordinary compartment, not cold storage, because it would protect the fruit and absorb the moisture.

The PRESIDENT: I can partially answer that question, regarding the latter part of it. We always use this sphagnum moss for packing the trees, and have done so for years. Formerly we obtained it for the hauling, some twelve miles from our premises at Fonthill, but for the last two or three years there has been a company operating that, having purchased the marshes there, and we have had to purchase moss from them. Last year for the first time we purchased it put up in bales all ready picked. I forget the price, but it was not great. Any one can obtain it from this company in Welland County, who are trying to introduce it as bedding for horses.

Mr. E. D. SMITH: In what shape do they offer it—full of little roots, or clean?

The PRESIDENT: No, all the roots are picked out, and the moss itself has been picked apart, and it is packed in bales ready for use.

Mr. TWEDLE: I heard it is sold in St. Catharines for horse bedding at \$11 a ton.

The PRESIDENT: My recollection is it was about \$10 a ton, taken in quantity.

REPORT OF THE FRUIT COMMITTEE.

Your committee have much pleasure in reporting that considering the short crop of apples for the season of 1897 we find a very creditable display on the tables before us at the annual meeting for this year.

First we find a collection of apples shown by Mr. Dempsey, of Trenton, consisting of twenty-four varieties, all very fine for this year. Among them worthy of notice is an extra choice plate of Northern Spys, a fine plate of Ontarios, some good specimens of Mann, Fallawater, Stark, Hubbartsons, Non-such, etc. There was also among this collection some of the newer sorts, such as Boiken, a large sized yellow, only fair in quality, but apparently a good keeper; another known as Horn, very fair size, red and rather handsome in appearance but quality only fair; and also another very handsome apple resembling somewhat a large sized well colored Wealthy, and quite equal to that variety in quality and about the same season. Mr. Dempsey also shows eight varieties of pears, among them the Idaho, Mount Vernon, Josephine, Duchess de Bordeaux, the latter a new pear of good quality, medium size, season December; a fine Buerre Grise, Kieffer, and a seedling from Josephine.

Mr. Huggard, of Whitby, shows a good collection of apples mostly standard varieties, but among them a seedling of fair size and appearance, fair quality, and said to be an extra good keeper. This seedling was grown by Mr. S. Wilson, of Whitby. Mr. Huggard also exhibits several varieties of pears of his own growing.

Mr. Wellington shows a number of American pippins of good size and splendid keeping qualities.

Mr. A. M. Smith, of St. Catharines, shows a nice collection of pears, among them fine specimens of Anjou, Buerre Diel, Josephine, Lawrence, Mount Vernon and Kieffer.

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W. M. Orr, of Fruitland, shows two plates of well preserved Vergennes grapes.

R. O. Tye, of Haysville, shows a fine sample of Drop d'Or apple, and a Mr. Stewart shows a large, very fine appearing seedling, but of poor quality.

There is also an exhibit of a large Prussian apple called Brood, grown at Port Dover. It is a very large, handsomely colored, apple, irregular in shape and only fair quality.

Prof. Saunders shows a collection of sixty varieties of apples, grown at the Experimental farm, Ottawa, half of them of Russian origin. A few of the latter are worthy of cultivation, but many of them are worthless for this country. Among the old standard sorts were fair sized samples of La Rue, Ontario, McIntosh Red, etc.

T. H. RACE.
GEO. E. FISHER.
M. PETTIT.

WELCOME FROM THE LOCAL HORTICULTURAL SOCIETY.

Mr. J. S. LOCKIE said: "I am here on behalf of the Waterloo Horticultural Society, to welcome this Association to Waterloo; and it is now eminently fitting that we as a Society should welcome this Association, because had it not been for them, I think there is very little doubt, we would have had no horticultural society in Waterloo so far. We had no personal experience in the making of horticultural societies save what we knew of others. In a town not a hundred miles from here they formerly had a horticultural society. The main object and end of that society seemed to be to have an exhibition and to take prizes. The whole of their money was spent in that way; and when you looked at the prize list you saw that about three prize-winners won the bulk,—say ninety per cent., of the prizes. In some respects that was a representative exhibition, for those three, and a few others that assisted not only exhibited all that they could raise themselves, but they were in the habit of scouring the country for a week or two before the exhibition to beg and borrow plants, fruits, flowers and vegetables—anything that would take prizes. Then, of course, these three took a great interest at the beginning of the year in getting subscribers—getting sufficient names to enable them to get the government grant; and then when they had their exhibition on, these parties were invited to pay twenty-five cents apiece and go in and see where their money went to. Of course there was only one result of that; people tired of that kind of a thing, and the society died a natural death; and I have no doubt but these three individuals were chief mourners at the funeral. (Laughter.) Having had that experience, we had no desire to imitate that condition of affairs; but when Mr. Beall, kindly sent by your Association, came here and invited a few of us to discuss the matter, he placed it in an entirely different light from what we had ever known of. He first took the Agricultural and Arts Act, showing what assistance the Government gave to such societies, and the conditions applying to those grants, and took very strong grounds against spending the money in prizes, as a way that was unprofitable and unsatisfactory; and he showed us that by purchasing plants, bulbs, literature, employing lecturers, all the members and the community would be benefitted, while in the other way only a few were benefitted, and there was a good deal of dissatisfaction as the result. He made the matter so clear to us, and laid before us what he considered an ideal horticultural society, that we agreed to see what could be done; and the seed that Mr. Beall sowed fell on good ground. Probably you are aware that the majority of the people of this town are Germans or of German extraction; and if there is any one thing more than another that a German cares for it is his home and his garden, the growing of his vegetables and small fruits, and having flowers in his home. (Hear, hear.) So we had no difficulty. It really required very little labor. In a very short while we had seventy-five members for that year. The success of the Society was almost unprecedented. It was exceedingly satisfactory—so much so that the next year, without any effort, we had 125 members; and this, our third year, we have 155 members. That

is not a bad showing for a town of 3,300 inhabitants. And to give you an idea of what good has been done I will just show you what we have distributed during this year. We got from your Association and distributed to our members twenty-five new Japan lilacs, seventy-five Japan lilies, twenty-eight Conrath raspberry, and thirty seven Dempsey pear trees. Regarding the lilies I may say that we got a splendid lot of bulbs, and I saw one Japan lily growing in the garden of a gentleman whom I see before me, that had thirteen flowers growing on it; so they were exceedingly satisfactory, and we are very much obliged to your Association for them. Then of what were purchased by us we distributed sixty-seven plum trees, sixty-seven cherry trees, 402 raspberry plants, thirty-seven Hydrangea grandiflora, thirty-seven rose bushes, 612 house plants, and 1,860 hyacinth bulbs. I think it requires no explanation on my part to convince every one that such a distribution must have a great effect in a small town like this; and that effect will be shown in future years. The hyacinth bulbs have been exceedingly satisfactory. Probably a good many of the members have not grown hyacinths before, and now you can hear children going to the school telling each other about the beautiful flowers they have in their houses. See the influence that this had. The children saw the dry, hard-looking bulbs come there, and they saw the parents take the tin can or the flower pot, and get some earth, and put these bulbs in there and set them away in the cellar, to stay there for six weeks or two months, and were very anxious to know why this was done. Then they saw that dead bulb brought up, and a spike started, and they watched that spike day after day till it blossomed out a beautiful and fragrant flower, as good as many of the richest men have in their conservatories. We well know that your Association has done a great deal, and has the assistance of the Government, which is correct, and that the main object of that has been to encourage fruit growing in this country as a great source of wealth as well as health; but we consider that the Government is not at all out of place in assisting floriculture in this way. The province of a government is not only to see that the children are educated, and to preserve the peace and order and lives and property of the citizens, but to encourage industry, to encourage home-making, to educate the children; and I can see nothing that has a tendency to encourage home-making more than growing flowers about the house and garden. (Hear, hear.) I consider that children brought up under such influences will be very likely to be better men, intelligent and industrious citizens, and therefore the Government is doing wisely in assisting in this way. We have an exhibition, but it is not quite like the one I mentioned to you before. Everything is free. The town council kindly gives the use of the hall free, and we make it open to everybody, not only to members of our Society, but to all who choose to bring anything to assist in making an exhibition here. Not only that, but we have conveyances to bring and return anything that is heavy and valuable. Sir, you would require a visit here to know the interest that is taken in that exhibition, and the pleasure and satisfaction it gives. Where prizes are given you must of necessity classify your exhibits; you must place each in the one place; but this is entirely different. We have a committee of our ladies here that have excellent taste, that arrange these on the table and in the centre and around the sides of the hall, and they place these for the best effect; and I think anyone considering this for a moment will see how you can arrange flowers and shrubs of the different colors and make a beautiful display—very much better than you can where there is to be judging. Why, sir, it would surprise you; you would consider this platform a fairy bower if you saw the way the ladies have it decorated with plants. Where you have prizes you are certain to have a good deal of grumbling. Mrs. Jones is not satisfied because the judge favored Mrs. Brown; and so it goes. But now you will hear the expressions, "Well, this is splendid, and I'm going to have something to help make it better next year!" That is the feeling with regard to it. We of the Waterloo Horticultural Society have a creed. We believe in the Waterloo Horticultural Society—that it has done a great deal of good here, not only benefitting the members, but encouraging an elegant and refined taste, and it has been for the improvement of our town and our homes and our public parks. And we believe in our town. We know and feel that we have a prosperous town, a busy town. Most of our factories are working time and a half just now, and we have a steady, sober, industrious population; and I can tell you more than that, we have neither a pauper nor a drunkard

in the town. not only for country; and greater things. Many of us affection—he consider we good laws we highest position and where the for; and, sir, portion of the therefore with We have not been gratified still further influence and

Mr. W. pleasure on h thanks for th we might hav lington, in th laughter.)

I am g can see from I am glad th Ontario Fruit all those year who have ma everything ab Ontario. We Palestine. E trying for big large as the b magnificent st to be satisfied men who are trouble fruit down to the S say that we h has perfected the other by that you have made the mist but for illegal a time when is to-day; and countries unde and there is no we in Ontario one of the very wisdom I have it all at your that you tell u

in the town. (Hear, hear.) Then we believe in the Ontario Fruit Growers' Association, not only for what they have done for us, but what they have done for the good of our country; and while we are aware of what has been done by them in the past, we expect greater things in the future. And we believe in our country; we believe in Canada. Many of us have been born in distant lands, and, of course, we revere those lands with affection—he would be no man who would not—but with all that we love Canada. We consider we have as grand a country as the sun shines on—a country well governed, with good laws well administered, where rich and poor are equal in the eyes of the law, and the highest position in the land is open to the humblest subject, where education is free to all, and where the afflicted, the unfortunate and the feeble-minded are protected and cared for; and, sir, we are proud to know that this Canada of ours forms no inconsiderable portion of the greatest and grandest empire the world has ever seen. (Applause.) It is therefore with pleasure that we welcome you as an Association to the town of Waterloo. We have not been able to entertain you as has been done in other places, but we have been gratified and pleased with the meeting, and hope for good results, and we wish you still further success in your work. We trust for a great deal of good through your influence and your exertions in the future, therefore we wish you God speed.

Mr. W. M. ORR, vice-president, responded as follows:—It affords me a great deal of pleasure on behalf of the Ontario Fruit Growers' Association to tender you our hearty thanks for the very warm welcome you have given us. Perhaps this is nothing more than we might have expected in this loyal town in this Queen's jubilee year, for again Wellington, in the person of our President, led his forces to Waterloo. (Applause and laughter.)

I am glad to know that you have a prosperous Horticultural Society here. I can see from the large company present that a deep interest is taken in your work, and I am glad that this not only refers to your own society but extends to ours. The Ontario Fruit Growers' Association has been in existence for thirty-seven years. During all those years a great deal of hard work and good work has been done. We have men who have made a thorough study of all the branches. We have men who can tell you everything about an apple, from the forbidden fruit right down to the last seedling in Ontario. We have men in grape culture that have greater variety than they had in Palestine. Every year they are trying to get better grapes; and that is not all, they are trying for bigger bunches. They are not going to be satisfied until they get them as large as the bunches of Eschol. Then we have experts in strawberry growing who grow magnificent strawberries, supplying us during the regular season, but they are not going to be satisfied until they can furnish them all the year around for us. Then we have men who are skilled in dealing with insects—worms and bugs and all these things that trouble fruit growers. They can tell you all about them, from the insects of Egypt right down to the San José Scale. (Laughter.) That covers the whole ground. I forgot to say that we have men in floriculture as well, and we have one gentleman at least who has perfected it so completely that he can live on two meals a day, and he makes up for the other by feasting himself on a bed of roses. (Laughter.) I am very glad, indeed, that you have such a prosperous society here. From the time that our first parents made the mistake and were turned out of the Garden of Eden, not for cultivating wrong but for illegal consumption of fruit, right down to the present time, there never has been a time when agriculture and floriculture has been in a more prosperous condition than it is to-day; and I rejoice to know that, as has already been said, we have one of the finest countries under the sun. There is not a finer land that the sun shines upon than Ontario, and there is not a more happy and prosperous people on the face of the earth to-day than we in Ontario (applause); and I rejoice to know that right here in Waterloo you have one of the very best horticultural societies there is. Now, sir, with all the accumulated wisdom I have referred to with regard to the fruit growers in the different lines, we lay it all at your feet, you can gather and glean, and it is all yours; all we ask in turn is that you tell us how to carry on a local horticultural society successfully. (Applause.)

THE CHRYSANTHEMUM.

By H. L. HUTT, B.S.A., ONTARIO AGRICULTURAL COLLEGE, GUELPH.

The chrysanthemum, or "Mum," as she has been rudely nicknamed, has been justly called by one writer "The Autumn Queen," and by another "The Star-eyed Daughter of the Fall." Coming into bloom in the month of November when all nature in our northern clime seems to be in its most sorrowful mood, I sometimes think this grand flower has been given as a compensation for the loss of summer friends, and to help us to be bright and cheerful at the Thanksgiving season.

The increased attention which is being yearly paid to its cultivation, shows that its popularity must be based upon real merit. One writer has said that "the transcendent merit of the chrysanthemum lies in its almost limitless variety of form, texture and color of flowers," to this I think might be added the ease with which it may be cultivated. It is not now the flower of the florist only, but it is being more generally grown throughout the country in the homes of amateurs.

ITS HISTORY. Very little that is new can be said of its history, yet something along this line may be of interest. The chrysanthemum has had its origin from one, or perhaps two, small, single-flowered species of plants native to Eastern Asia, their nearest relatives in this country being the disreputable ox eye daisies. For many centuries before it was introduced into Europe or America it was cultivated, improved, and brought to great perfection by the painstaking gardeners of China and Japan. In the latter country it is the national flower, and may be seen upon all of the modern Japanese coins. The "kiku," as it is there called, is also one of the crest badges of the imperial family, and is used on the official seal. On the ninth day of the ninth month is held the annual "Feast of Chrysanthemums," when, it is said, the people not only revel in the beauties of the "mum" but feast on a cold slaw made of its petals. To some unknown Dutch voyager is probably due the honor of first introducing it into Europe. This was about the end of the seventeenth century, but it was not until the second decade of the present century that the flower came into general cultivation.

The first seedling raised in Europe was in 1827, and the first chrysanthemum show held in England was at Norwich in 1829. New varieties were from time to time brought in by the tea ships, and the list of varieties under cultivation increased each year. The first plants of the Pompon section were sent to England in 1846 by Robert Fortune, a collector for the Royal Horticultural Society, and in 1860 he introduced the first varieties of the Japanese type. From that time to the present the interest in its cultivation has steadily increased.

Just when the chrysanthemum was introduced into America we do not know, but the first chrysanthemum exhibit for prizes on this continent was held at Boston in 1861, under the auspices of the Massachusetts Horticultural Society. In 1868 it was styled a chrysanthemum show. These shows are now common annual occurrences throughout the country. The chrysanthemum show at Toronto last month was probably the finest exhibit of its kind that has ever been held in Canada, and excellent smaller shows were held in many towns and villages throughout the Province.

POSSIBILITIES OF DEVELOPMENT. At each annual exhibition new varieties are being introduced, and something new of interest is added to the development of this "Star-eyed Daughter of the Fall." The size has been greatly increased and the variety of shades of color has been multiplied. The variety which created the greatest sensation at the time of its introduction was the one named after Mrs. Alpheus Hardy, this being the first of the hairy or ciliated type, which is now represented by many excellent varieties in various shades of color. With all the new shades of color which have appeared, we have still, however, to wait for the much talked of blue chrysanthemum. How long we may have to wait is hard to tell.

What, to my mind, is most needed now in the way of improvement, is the development of constitution and strength of stem in the plant. Many of our finest varieties, in

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order to show their bloom, have to be supported like cripples on crutches and staked with a forest of props. When these supports can be done away with a considerable step in advance will have been made.

METHODS OF CULTURE. Open air culture in the flower border is not altogether satisfactory in this latitude on account of the danger from early fall frosts, although in the southern part of the province I have frequently seen them grown in this way. The Pompona varieties, with their bright colored, little button-like flowers are the hardiest and best adapted for this purpose, as are also some of the early flowering larger varieties. Small plants may be set out as soon as danger of frost is over in the spring. They should be planted from one and a half to two feet apart, in good rich garden loam, kept well cultivated, and watered if necessary. The quality and quantity of bloom will be almost in direct proportion to the amount of attention given them.



1. Plant in suitable condition for furnishing cuttings. 2. Sample of cutting.



A well-rooted cutting.

OPEN GROUND, FOLLOWED BY POT CULTURE. This is the method usually followed by amateurs who have not the time or conveniences for growing the plants from first to last in pots. About the last of August the plants are lifted from the beds in which they have been growing all summer and are potted in eight or ten-inch pots. This must be done carefully, with as little injury to the roots as possible. After potting they should be well watered, and shaded during the hottest part of the day for a week or so until the roots become established in the pots. They may then be kept out of doors and allowed to get all the sunshine possible, taken into the house as the nights become colder, and placed in bright sunny windows where their blossoms will look out and smile in contentment upon the blustering storms of November and December.

ALL SEASON POT CULTURE. This is the method by which the best results are obtained, and as it is practiced altogether in the production of exhibition plants, and frequently also by amateurs in their home collections, I shall speak of it more fully and in detail.

PROPAGATION. When the plants have done flowering they should be cut down to within a few inches of the soil. A forest of little shoots will spring up which may be used to start new plants. These cuttings may be taken any time from January to May, but as a rule those taken in February or March give the best results. The cutting should be about three inches long, made with a smooth cut at the bottom just below a joint, and the

lower leaves should be removed. The roots may be started by inserting the cuttings in clear, sharp, gritty sand. If but a limited number of plants are wanted they may be started singly or otherwise in small flower pots. An old bread pan with a perforated bottom and filled with about three inches of clear sand makes an excellent propagating bed for the use of the amateur. It goes without saying that the sand should be kept moist, and for a few days after the cuttings are inserted they should be shaded from the midday sun by placing over them a sheet of newspaper, but as soon as established in their new quarters the more sun they can get the better.



Chrysanthemum as first potted into three-inch pots. 1. "Mum" in four-inch pot ready for first heading back. 2. As headed back.

POTTING. As soon as it is well rooted and a few new leaves have formed, the young plant should be potted into a three inch pot. When the roots have filled this, as may readily be seen by straddling the stem with the fingers and tipping the plant out, it should be repotted into a pot one or two sizes larger, from which size it should be potted into a six or eight inch pot, and allowed to bloom in this, though better results are obtained by getting the plant into an eight or nine inch pot a month or two before the time of bloom. When potting into any size of pot larger than four inches, an inch or so of broken pottery, brick, or charcoal should be placed in the bottom of the pot to assist drainage.

THE SOIL. The soil for chrysanthemums, or in fact any pot grown plant, requires considerable attention. No absolute rule can be laid down as to what mixture is the best, as soils vary so much in different parts of the country. One of the chief ingredients in any mixture should be well rotted sods or turf. We prepare this by cutting the sods in the fall, piling them upside down in a large heap, with a few layers of rotting manure throughout the heap. During the following summer the heap is chopped down and turned, and when needed for potting enough sand is added to make the mixture friable so that it will not bake in the pots. A little bone meal mixed with it at this time gives good results afterwards.

WATERING. Many amateurs are at a loss to know how to water pot-grown plants properly. One of the best rules that can be given for the guidance of such is to withhold water till the soil begins to look dry on top, then give it a thorough soaking. A florist

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can always tell when his plants need watering by the hollow sound that the pot gives when rapped with the knuckles. The frequency with which plants need watering depends much upon the temperature and the amount of moisture in the atmosphere, as well as upon the exposure to strong sunshine. Rain or soft water is the best. Besides watering the soil it is well to occasionally syringe the foliage, or to take advantage of nature's watering by placing the plants outside during a gentle rain.



"Mum" in six-inch pot, ready for second check.



"Mum," grown as a tree plant.

EXPOSURE TO SUNLIGHT. Chrysanthemums revel in sunshine. There are a few plants like the Calla lily, begonia, and fuchsia which do best when not exposed to the strong midday sun, but the chrysanthemums can hardly get too much of it, provided the temperature does not get too high accordingly. When grown in a window where the light comes all from one side, the plants should be turned every day or so to keep them growing symmetrically, otherwise they are likely to turn their backs upon the household and smile upon the strangers in the street.

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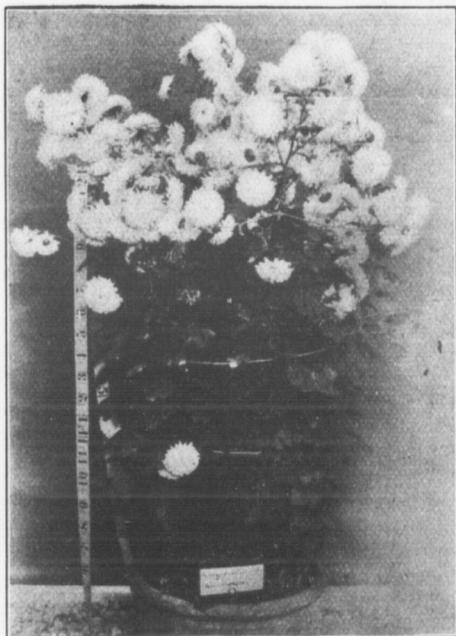
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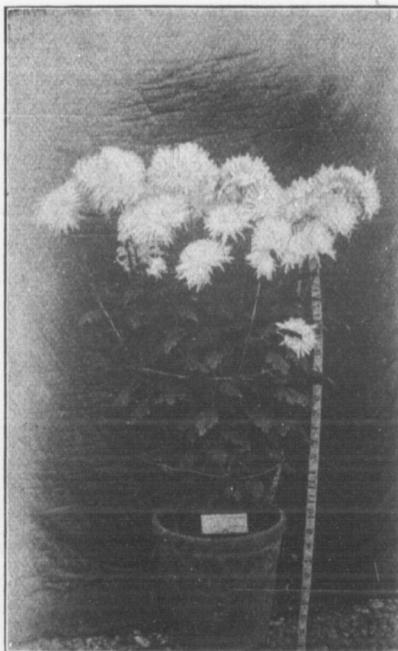
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TRAINING AND STAKING. The method of training the chrysanthemum depends very much upon the object sought. If the grower desires to get an extra large bloom the plant should be trained to a single stem. All of the lateral buds should be pinched off as they appear and the terminal bud only allowed to develop a bloom. In this way we get an immense flower but the plant is to say the least top-heavy and unsightly.



Rose Travena.



Ivory.

The best looking specimens, both plant and bloom considered, are grown as bush plants. To obtain a plant of this kind the terminal bud must be pinched out when the plant is five or six inches high. In a short time five or six shoots will branch out, which must also be stopped when four or five inches long, and the operation repeated upon the shoots which branch out from these until we get a bushy symmetrical plant, having plenty of good strong branches upon which the bloom will appear later on in the season. If quality rather than quantity of bloom is desired the weakest of these flower buds may be pinched out and the vigor of the plant directed into the larger buds left.

Staking will be found necessary to support the branches by the time the plants are half grown. The neatest and least conspicuous stake we have yet found for the purpose is made of stout, corrugated steel wire, like that used for stays in wire fences. These may be painted so that they will hardly be discerned among the dark green of the foliage. We use three of these stakes to each plant, the length varying from two to four feet according to the height of the plant. Two or three hoops of much smaller wire are tied around these forming a circular trellis with the plant in the centre, keeping it in shape with as little unsightly staking as possible.

GROWING EXHIBITION PLANTS. For the growth of large exhibition plants, more care is necessary than can usually be given by the amateur, and unless he has a green-house it is hardly worth while attempting it. To get a standard plant, which is expected to assume tree-like proportions by October, a vigorous growing variety must be selected

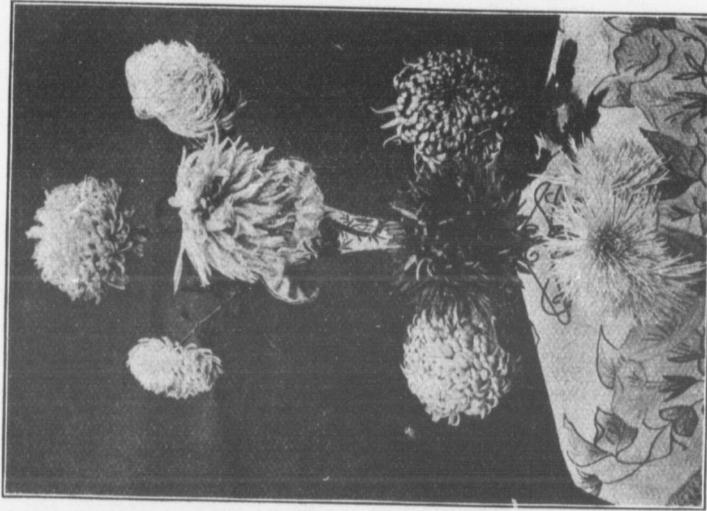
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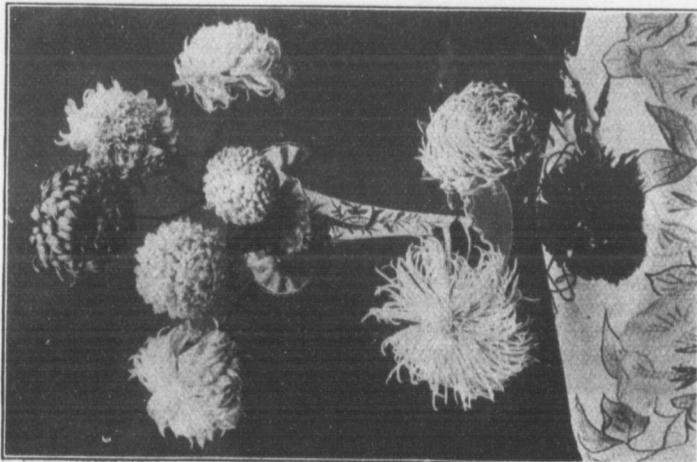
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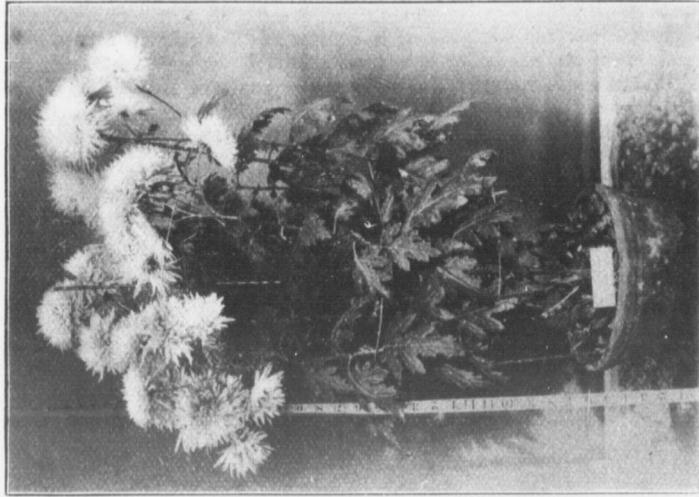
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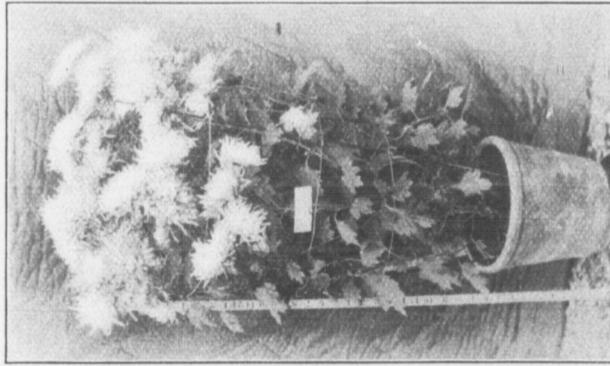


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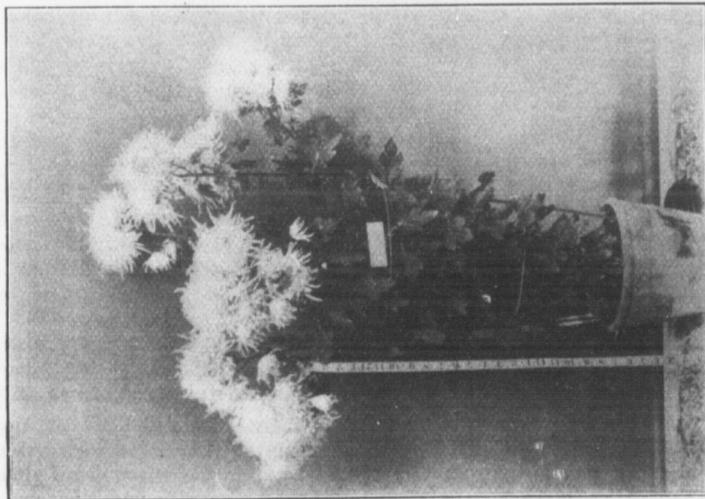


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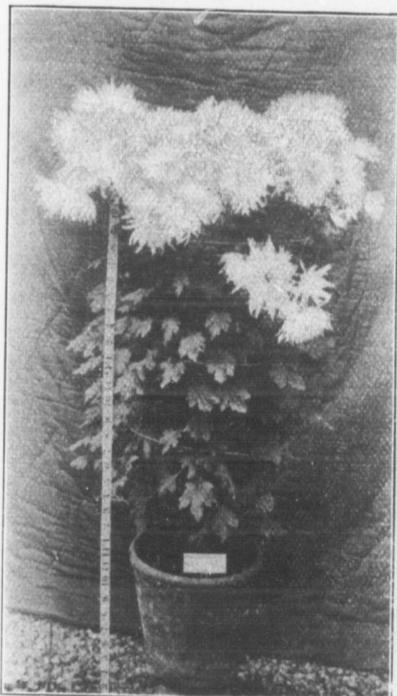
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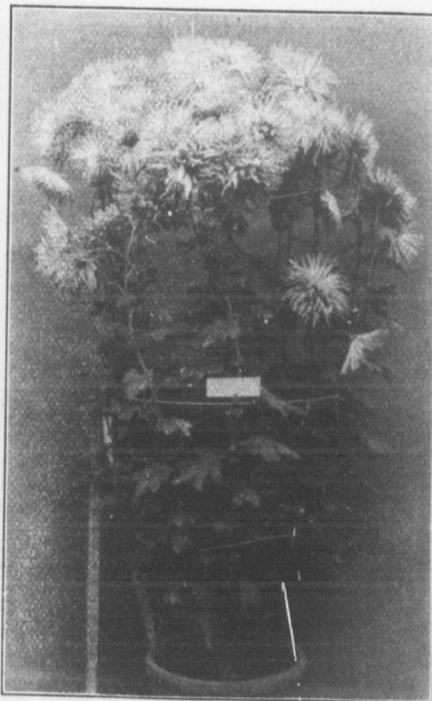
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and started early. It must be trained to a single stem and allowed to grow to a height of from three to four feet before it is stopped. A bushy head may then be formed by repeatedly nipping back the branches at every first or second joint.

Another popular way of growing chrysanthemums is what is known as "Single blooms in five inch pots." The beauty of these is the dwarf size of the plant and the large size of the bloom, although I think the beauty of the plant as a whole is improved by allowing three or four blooms to a plant. To obtain such plants it is necessary to start the cutting in May, pack the soil in which they are grown very firm, keep in small pots, and pinch back lateral buds as required.



Infant des Deux Mondes.



Rohallion.

CLASSIFICATION AND VARIETIES. Any classification of chrysanthemums nowadays is a difficult matter and very unsatisfactory. The best classification, and the one usually adopted, is as follows: Pompons, Singles, Anemones, Chinese Incurved, Chinese Reflexed, Japanese Incurved, Japanese Reflexed and Hairy Japanese. But with all the crossing and re-crossing, which has produced so many intermediate varieties, it is often difficult to say to what class any particular variety belongs to. The list of varieties, too, has become so long that only a few of the best of each class need be mentioned.

The *Pompons* bear small button-like blossoms, an inch or an inch and a half in diameter, of a great variety of colors. The plants are of dwarf habit, hardy and very free flowering. *Rose Travena* is the most desirable variety of this class I have tried.

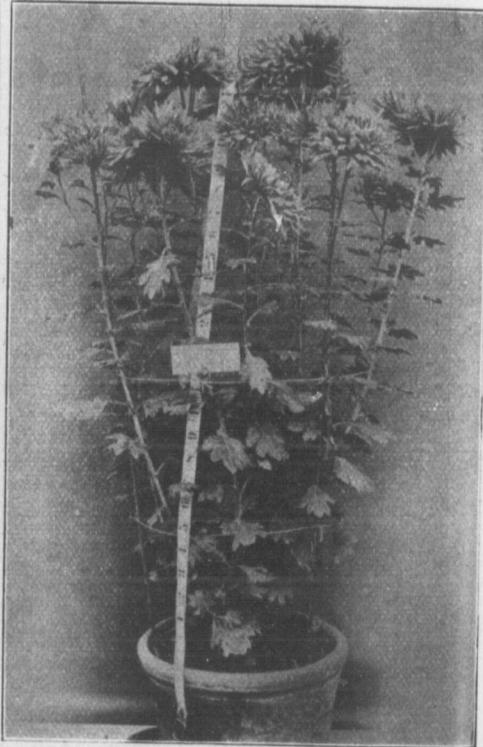
The *Single Chrysanthemum* is built on the same plan as the *Ox-eye Daisy*. An endless variety of these may be obtained by sowing seed, but, as a rule, they are hardly worth while cultivating.

The *Anemones* have only one or two rows of ray flowers, which may be wide spreading or drooping. The centre florets are usually the same color as the rays, but are quilled and very much shorter. Judge Hoitt is a typical variety of this class.

The *Chinese Chrysanthemums* are characterized in the typical forms by the regular globular form of the flower, and the evenly imbricated petals of medium width. In the incurved section the petals arch gracefully inwards towards the centre, while in the reflexed section the petals are curved backwards. A few of the best I have tried of this class are: *Ivory*, an early, pure white, of dwarf habit; *Mrs. L. C. Maderia*, a symmetrical, compact globe, of bright orange color, and *Mrs. George Glenny*, a profuse bloomer, bearing medium sized flowers of a pale sulphur yellow color, a beauty when loaded with bloom.



Vivian-Morel.



W. H. Lincoln.

The *Japanese Chrysanthemums*, and the numerous hybrid forms which have emanated from them, make up the majority of our large flowered varieties. Some have flat petals, in others they are fluted, quilled or twisted. Some are broad and short, others are long and slender, almost thread-like. In some the petals are incurved over the centre, in others they are reflexed.

The petals of the hairy varieties are covered with hair-like granular growths. This type is one of the most recent introductions, and already includes many choice varieties. An extensive list of grand Japanese varieties might be given. In our collection at the College we have about 130 varieties, but I shall mention only a few of the most desirable ones, including the various shades of the different types.

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Maud Dean. This is a variety which can hardly be commended too highly. The flowers are large, a beautiful shade of lilac pink, and of great substance. The plant has stiff, strong stems, is short jointed and of healthy compact habit.

W. H. Lincoln. The habit of this variety, like the one just mentioned, is nearly all that could be desired. The flower is large, and probably one of the best of the bright golden yellows.

Joey Hill. Flowers very large, florets broad and reflexed, cardinal red above and old gold beneath. The plant is healthy and free flowering, but rather tall.

Rohallion. An excellent pale yellow. The flowers are medium size, the florets semi-quilled and curled. Plant healthy, vigorous and a profuse bloomer.

President W. R. Smith. A rather tall growing variety for window culture, but one of the best to grow as a standard. Flowers large, late, incurved and of a very pleasing shade of light pink.

Lilian B. Bird. This is also a rather tall grower, but the bloom is very striking, being made up of long straight quilled florets, of a soft shade of light pink. One of the latest to bloom.

Iora. An exceedingly artistic flower of light pink color. It is also a quilled variety, but unlike the one last named, the florets are curled and twisted. The plant is moderately short jointed, vigorous and very free flowering.

L'Enfant des deux Mondes, or The Child of Two Worlds, is one of the finest of the hairy varieties. Flowers large, pure creamy white and densely covered with granular hairs. Plant of good compact habit and a profuse bloomer.

Louise Boehmer is a beautiful magenta pink, of the hairy class, and similar to the last mentioned variety in almost everything but color.

To those who would like to get more information on the subject than could be given in a short paper, I would like to recommend some literature which would, no doubt, be of interest to them. One of the best books on the chrysanthemum is "Chrysanthemum Culture for America," by James Morton. As an excellent work on floriculture generally for the amateur, I could not recommend anything better than "Vick's Home Floriculture," by E. E. Rexford, the popular writer on that subject in the *Ladies' Home Journal*.

CACTI.

By JAMES LOCKIE, WATERLOO.

I have been requested to offer a few remarks on the cultivation of Cacti, those peculiar children of the sun, natives of the warmer portions of this continent, the largest number having been found in Mexico and Texas, with one trifling exception they are purely American. In their native countries they grow under very varied conditions. The *Phyllocactus* and *Epiphyllums* are Epiphytes or air plants growing on trees without any soil, the wet ground and tropical heat furnishing the necessary moisture, here they will not grow as air plants but thrive in sandy soil, while the *Epiphytal Orchids* found in the same localities can only be grown in moss instead of soil and in warm moist conservatories. Nearly all the other varieties of Cacti grow on barren sandy plains or in crevices of rocks in localities where the heat of the sun is intense and the rainy season short. Botanists tell us that the skin or bark of Cacti has very few breathing pores, resembling in this respect the skin of apples, pears, plums, and other fruits so that they absorb the water through their roots during the rainy season, and enjoy the strong heat where plants with soft porous leaves could not live.

Growing under such different conditions, the problem with cultivators has been to find the most suitable soil to grow them in, and the opinions have been nearly

as numerous as the cultivators, and as they have done well in very different soils I think we may conclude that they will grow in any soil if sufficiently open and porous so that water may pass freely for water logged soil is certain death to Cacti. I have found sods from a sandy knoll suitable, by paring off the grass; the under part is a net-work of fine porous roots in sandy loam in which they thrive. The strap leaved varieties may have some leaf mould added as they can stand richer soil. Formerly Cacti were kept in pots the year round, but now nearly every one plants them out in summer. Mix the ordinary garden soil with an equal quantity of sand, and have the situation elevated so that water will run off. They enjoy the sun and rain and the growth they make is surprising. Their fresh healthy appearance is a contrast to the shrunken specimens in pots. Phyllocactus when planted out enjoys the heat but should be shaded from direct sunlight which is apt to scald and burn them. Regarding the different varieties, these are so numerous and varied that time will only permit the briefest mention. The Phyllocactus the flat or strap leaved spineless family are the best known, easily grown and generally most satisfactory. Some are day, others night bloomers, and all are very floriferous. The variety Latifrons, or the Queen Cactus is one of the best and when a good size can be depended on for plenty of flowers every summer. They are pure white, six inches in diameter, fragrant, opening at night and closing next morning. This plant is often wrongly called "The Night Blooming Cereus," which is an entirely different plant. It is *Cereus Grandiflora*, of a semi-climbing habit, with rope like stems, seldom thicker than a man's thumb, having four to eight slight angles or ridges. The flowers are ten inches in diameter with a rich perfume; but while this plant is very easily grown and largely used to graft other varieties on, flowers are very rare, so that Latifrons is a much preferable plant to grow. The Epiphyllums or Crab or Lobster Cacti easily grown, and profuse bloomers in February and March, being of a rather drooping habit they are improved by being grafted on the *Pereskia* stock, or on some of the *Cereuses* and make handsome umbrella like plants and less liable to damp off at the neck. The *Cereus* are a large and very varied family, from the creeping *Flagelliformis* or rat tail up to *Cereus Giganteus* fifty to seventy feet high in a straight unbranched column, all are easily grown and mostly free bloomers.

There is a subsection of which *Pilocereus Senilis*, "The old man Cactus" is the best known representative being covered with long white hairs it is one of the wonders of plant life I have never heard of its blooming and think a flower on it would be an incongruity. Of the round spiny Hedgehog Cacti there are various families and numberless varieties, nearly all are free flowering, and their various colored spines make them handsome plants when not in flower. The *Opuntia* family are excellent bloomers, the great drawback to their cultivation is their spines which are very fine and slightly barbed so that they pierce the skin readily are painful and difficult to remove. In districts where they live outside, and do not require handling, they make a magnificent display of brilliant flowers, a clump in bloom is a sight worth going far to see. The conditions necessary to success in growing Cacti are more easily provided than for most other plants, and may be briefly summed up as follows. Sandy porous soil, small pots, all the sunlight and heat possible, in summer, with plenty of water, but cool and dry in winter. If the temperature is over fifty degrees in winter they require some water to prevent drying out altogether, but not sufficient to start growth, they require rest.

As a class they are not much troubled by insects, or subject to disease. The mealy bug is about the only troublesome insect, and for that spraying with alcohol is a certain remedy rot is caused by over watering, as soon as seen cut off the decayed part back to the fresh, lay in the sun for several days until the cut has callused, then insert in sand, but not deeply. Keep shaded and slightly moist until roots form, then replant in proper soil. This is the common method of propagation by slips or cuttings.

Trusting these remarks may increase the interest in this curious and beautiful class of plants as I am certain every one will be delighted in growing a few Cacti.

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THE CANNA AND THE GLADIOLUS.

BY MR. H. H. GROFF, SIMCOE, ONT.

In speaking to a joint meeting of two societies having different interests, it will be necessary for me to combine with the instructive and entertaining the complaints and trials with which I must contend. While I have no desire to urge my personal interests on you to-night, it is only fair to say that I am not a commercial grower or dealer but a scientific amateur (or amateur scientist) who has given years of labor and all necessary expense to a work of small but select character, actuated by love for beautiful things and the pleasure of doing a thing well.

In repeatedly appearing before this association, I feel that an apology is due those interested in fruit growing for the stress that is put upon their patience and valuable time by my interest in the decorative aspect of horticulture. I say this with great seriousness, because, at least so far as my experience goes, the blooms of their orchards are to them the most beautiful of flowers, bearing as they do a prospect of more material things than sweet perfume and pure delicate beauty of coloring.

The request is frequently made of me, in my efforts to inform and entertain our members, not to use scientific and botanical terms. Now I am fully in accord with the idea, that the use of unnecessarily intricate and technical terms is worse than absurd, when one is speaking with the view of conveying information; but, on the other hand, when the simple terms of classification as applied to various sections are complained of, it is time to ask the amateur, who is supposed to be here for the purpose of advancing himself on these very lines, to bestow upon the subjects offered for his consideration a sufficient concentration of mental effort to enable him to grasp the details presented with all possible simplicity.

I will go further and suggest that our affiliated societies take up at each meeting some one or more of the plants, shrubs, fruits, or native and ornamental trees in common use, and inform themselves as to their origin, history and possibilities; familiarizing their members with the proper terms and classifications, if only in a rudimentary sense.

It might also not be unreasonable to suggest that our secretary, assisted by his excellent library, give something on the above indicated line that might be used as a monthly lesson, with discussion by the various societies, in part substitution for valuable time now taken up in humorous or dramatic delineation.

Taking one of my specialties, the Gladiolus, often called the people's flower, on account of the assumed general familiarity of flower-lovers with its merited reputation for value and usefulness, I undesitatingly repeat here what constantly goes from my pen to American amateur and grower alike, that the flower is practically unknown to them. The amateur has not yet advanced beyond the idea that the value of a bulb is one cent or less, which barely pays the cost of production; and the grower in self defence must have a strain that is productive as a first quality, and in the survival of the strongest some weed rapidly predominates, and the advance is in quantity and not in value.

Exceptions has been taken to the terms *Gandavensis*, *Lemoinei*, *Nanceianus*, and *Childsi*; and these simple classifications are only of use to the amateur, conveying no meaning to the scientific worker. The first is an invention; the second is from the name of the originator of the section, and in perfect order; the third, by the same originator, is taken from that of his town; but the fourth is out of order and good taste, in being applied by the purchaser third removed from the originator, it is certainly not botanical, and it is in too common use to be considered scientific or technical.

If any hearer present fails to fully understand the ideas and meaning it is my wish and intention to convey, it will afford me both pleasure and satisfaction if the opportunity is promptly given me to make my expressions clearer, and if possible more simple.

With the view of outlining the methods under which my work has so successfully appealed to the progressive amateur, let me say that I have pursued a course directly

opposite to that of other growers claiming to advance the quality of the gladiolus. Instead of producing a strain from the seed and seedling of commerce, bred from the commonest parentage, and then urging their degenerate product upon the amateur under the exaggerated descriptions of colors hitherto unknown and indescribable by pen and painter's brush, I have tested those strains of American origin and development worth the trial, from the Atlantic to the Pacific, buying out the result of fifteen years' selection by the celebrated Luther Burbank, of California, and also the collection of that noted hybridist, Dr. Van Fleet, of New Jersey, including many new species and botanical hybrids, the product of over ten years of scientific crossing, largely upon the species, which is slow and unproductive work as compared with the results of closer selection.

In testing the best strains offered by growers in England, France, Holland and Germany, I have succeeded in locating the most advanced work on earth, and the best adapted to our soil and climate, these I have increased each year by importation as well as propagation. All this has taken years of work and thousands of dollars, but the results from the blending of this mass of unexcelled quality, has developed a foundation that will stand long after I am physically unable to continue the more refining and beautifying detail of closer selection. Each year of the past has been used to a great extent in outcrossing with the view of strengthening and perfecting some strain that has come to me lacking that degree of finish and vitality so necessary for the development of its maximum possibilities.

While it is not my intention to discontinue the importation of the most advanced hybrids of foreign origin, for the purposes of comparison and hybridation, the chief duty of my many years will be the harmonizing of the thousands of offspring from this extended assortment of such diverse constituents, each step being taken on the lines indicated in my paper on hybridizing to be presented to you in a few moments.

In addition to this effort in securing the greatest advances possible in the product of the world's scientific workers, to the limit of commercial methods as well as those of friendly interchange, I have followed the advance of exploration into Central Africa, the natural habitat of the most valuable species of the gladiolus known to the hybridist, and through the valued introduction of Prof. Medley Wood, curator of the botanical gardens at Durban, Natal, I have had the privilege of corresponding with a noted botanical explorer of Cape Town, now on his annual tour into the centre of "The Dark Continent," the outcome of which I await with confessed impatience. Of course the results of such experimental work can only be a matter of conjecture, but the experiences of the past fully warrant an entire withdrawal of restraint from the most extravagant and fantastic expectation.

It may be of interest to you to learn that the value of my hybridized seed has been recognized by the leading firms of America, and it is listed as my product by Peter Henderson & Co., New York; Henry A. Dreer, Philadelphia; D. M. Ferry & Co., Detroit, and J. C. Vaughan, Chicago; also F. C. Smith, Yalumba, Australia, so that the name of Simcoe not only vibrates musically upon the tongue of the antipode, but it is also known to the inhabitants of the neighboring republic, many of whom seem to think that our people live in perpetual cold storage.

During the past month the first of my seedling cannas offered to the trade, having been pronounced first class by expert growers of New York and Chicago, was sold to J. C. Vaughan of the latter place, the leading canna grower of the west. The production of tropical plants for exports is further evidence of the possibilities of our unrivalled soil and climate.

Referring to our seemingly unfavorable climatic conditions, and the tempting offer recently made me by an experienced and wealthy American hybridist, to join him in the more genial State of Tennessee, for the purpose of prosecuting our favorite occupation; observations made by me during past years have assisted my coming to the conclusion, that although our season is comparatively short for the production of seed from semi-tropical plants, our clear and stimulating atmosphere is much better suited to the work, and crosses can be effected with greater certainty than in more southerly localities,

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particularly those subject to period excesses of heat and humidity. After several years of experiment I have successfully ripened *Gladiolus* crosses made up to early September, by cutting the spike of seed capsules at first threatened, killing frost, and then maturing in water for a few weeks, until fit for the curing trays. Of course this often necessitates a night's work with artificial light, and special treatment of the immature crop so harvested; but in such operations the future success assured, is the only question of vital importance, and any special labor thereby entailed, is of no material consideration. With the artificial assistance above indicated, I have been able to mature a number of crosses unequalled by any operator within the limit of my extended correspondence, producing in 1896 fully a quarter of a million seeds, with even a still greater number in the season just past, and of a quality and parentage not obtainable in the world at any price.

Before closing my notes and passing to the more important subject of this paper, I wish to refer to the United States tariff, better known as the Dingley Bill. The chief items of my production are admitted to Canada free of duty, and although my specialties are eagerly sought for by United States growers and amateurs, on account of their high quality, the new duty is prohibitive. In the face of these facts our Canadian societies are using their Government grants in competition with my efforts to make for Canada, but in Canada, the name she deserves to bear for high standard of excellence, and the name she does win through thousands of her sons, but among a self-alienated people, and in the advancement of a self-styled alien nation. I ask for no protection beyond the equal right of free, untrammelled and friendly intercourse.

Whatever successes I am permitted to achieve as the result of my labors in the work-shop of the great Creator, are a gain to the world and to civilization; they are new creations, evolved from nothing; their original parents being simply weeds in the eyes of the refined admirer of beautiful flowers. And like the product of the miner's toil, they are drafts upon the treasure house of Nature, wronging and robbing no one; unlike the results of speculative competition, those mere exchanges of wealth too often besprinkled with the tears of the widow and the orphan, or even the successes of legitimate commerce, seldom attained without grinding competition, and involving the very life-blood of struggling man.

You will not wish to hear from me to night of those every-day beauties of the garden which are more or less familiar to all of us, ever carrying back our thoughts to our earliest interest in the simple work of childhood. But you will expect me to speak to you of that border land of mystery, where man is permitted to join hand with the great Creator of the universe, in guiding those forces of which he knows so little, until the highest flights of human fancy picturing seeming impossibilities in exquisite beauty, and never ending variation in form and color, sink into comparative insignificance, as the veil is slowly lifted before our expectant and wondering gaze.

The three great agencies that have been at work during the past century to increase the number of cultivated plants are, the introduction of new species, the selection of sports, and the hybridization of species already secured. The term species as used by me indicates those varieties found growing wild in various parts of the world, and may be taken to include a few natural hybrids, which, however, are rare, as it is the experience of all scientific workers that crosses between different species, even of the same genera, are most difficult to secure. By sports is understood those variations of growth from root or stalk buds, showing distinct characteristics to the original plant, and which maintain this distinctiveness, admitting of increase by propagation.

Hybridization, or cross-breeding of flowers, is the most interesting way of producing new varieties, if for no other reason than the absolute uncertainty of the result, and the limitless possibilities and endless variation following the breaking down of the barriers interposed by nature; and it is to this question that I shall condense a few thoughts and facts for our consideration. It is generally conceded that hybridization is the most potent of all agencies, for the choicest garden ornaments of to-day are hybrids, resulting from such a mass of crosses that to trace of their original parentage, would be beyond the reach of possibility.

I like the way Dr. Beadle put the subject before us at our meeting last year, when he dignified the work by claiming for the operator the position of being a co-worker with the Creator. For it is here that man, already granted control over the whole animal kingdom, the fowl of the air, and the inhabitants of the great sea, reaches out in his inborn craving for the infinite, and handles things unseen. And while of no greater importance than the most insignificant insect, so far as the mechanical act is concerned, yet guided by God given power and wisdom, he stands forth in the dignity and majesty of a creator.

Comparatively few of even those interested in horticulture bear in mind the fact that there is hardly a fruit or flower, or even the cereals of commerce, that are not the result of selection in some form, either hybrid, cross-bred, or sport, and practically all are accidentals. Let me say here that I use the term "hybrid" in its broadest sense, in which it may be taken to cover cross-bred varieties, as well as true hybrids or crosses between species. Although it is well known that selection is the great force in improvement, too many professional growers are content with selecting the seed parent only, and the credit they would like to take for this care and enterprise, would make them the subjects of ridicule with those who are improving by selection, all useful forms in the animal kingdom.

While there are few who consider the source of improvement in the fruits and grains with which they come in contact, the number is equally small who understand that the production of those they do see and use, is due to the actual necessity and fact of natural fertilization. By natural fertilization, I mean direct contact of and from the anther and stigma in the perfect flower, or the transferrance of pollen by wind or insect to those that are not perfect. By perfect, it is understood that class of flowers bearing both anther for the production of pollen, and stigma with it must come in contact in order to produce seed, as reproduction is the great effort of all nature, and the pulp of the apple, strawberry, pear, and similar fruits, is in this connection of secondary importance.

Many trees and plants bear the pollen and seed flowers on different growths, or distinct individual specimens. These are called imperfect, and are dependent upon outside agencies for their fertilization; and under favorable circumstances the work is effectively done by the wind and various insects. The failure of fruit crops is frequently due to a period of rainy weather washing and decomposing the pollen, thus preventing its being carried by the wind, or a season of unusual cold interfering with the natural activity of insect life. Fortunately the cereals of commerce are protected from what might be a serious conclusion, by the bloom commencing at the bottom of the spike or head and gradually opening to the tip, making total failure practically impossible; for the unfavorable conditions would have to extend over the lengthy period so wisely provided. And further in the case of grain fields, the pollen is produced in such profusion, that the breezes distribute it freely at some favorable period during the development of the plant.

It might be in order here to note a few points in connection with the origination of new varieties of wheat, which, like all other creations, is a single kernel act; but it has been calculated that a single grain of wheat is capable of being increased to nearly eighty billions of bushels, by sixteen years of multiplication. The wheat flower is a perfect one, having all the essentials of reproduction itself. A dozen or so are left on the head to be crossed, all others being cut away; the anthers are removed from the seed parent, as in my Gladiolus work. Then at the proper time an anther from the pollen parent is broken open, and the pollen sifted upon the stigmatic surface, now in a receptive condition. The head is then wrapped in tissue paper, carefully tied to prevent the interference of outside influences. A few of such crosses would prove successful, and from this result the best and heaviest kernels only are selected, each of which is subjected to years of repeated testing, until its quality is pronounced enough to be marked, and its superiority over existing varieties proven.

In the case of my specialties I shall first take the Canna. As the flower unfolds with the rising sun, the pollen is transferred from the anther, which is simply a development of one of the inferior petals to the side of the style, the tip of which is the stigmatic

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surface. The action of bees gathering the pollen for their young brood so scatters it, that a portion is deposited there; coming as they do from other flowers, the pollen is in this way mixed, and natural crossing is the result.

I wish to take this opportunity to correct the impression created by Prof. Calwell, in a recent address to the Buffalo Horticultural Society, in which he claimed that in order to cross the *Canna* with any degree of certainty the flower should be opened artificially, for the reason that it was fertilized naturally at this stage of its development. Now, as stated by me a moment ago, not only is this not the case, but the most careful attempt to open the flower is likely to bring about the very result the operator is endeavoring to avoid; and I wish to record here the fact, that it is the exception and a rare one, when the condition indicated by the learned professor is to be found.

With the *Gladiolus* it is different; the pollen matures to-day and the stigma to-morrow. At first these organs are wide apart, a provision of nature in her abhorrence of self fertilization. The bees and insects moving from flower to flower mix the pollen on the surface of the anther. As maturity approaches the anther and stigma draw closer to each other, and finally intertwine like the tendrils of a vine; the pollen being transferred during the favorable period.

Having indicated the conditions under which natural fertilization and crossing takes place, I will briefly detail the mechanical operation of cross-breeding. The *canna* may be effectively crossed early in the morning, before insects have disturbed the pollen; and I have found no better way than to collect and transfer the pollen with the fingers. For convenience my breeding stock is all grown in a large bed of special form.

In the case of the *gladiolus*, all pollen parents are protected by muslin bags, and those flowers intended for seed parents, have the anthers removed early each morning. When the time for crossing approaches, about nine o'clock, the pollen is collected by removal of the anthers with forceps and carried in a belt of original design to the seed parents, the crossing being effected by sifting the pollen upon the matured stigmas direct from the anther.

With the natural uncertainty of hybrids, some varieties of both the *canna* and the *gladiolus* produce neither seed nor pollen, while some compromise half way. Of course there is no possibility of crosses between species possessing no structural affinity, such as the apple and the pansy, which is a matter of regret, as pansy blossoms on apple trees would make a very taking novelty for the wonder department of our catalogue builders.

Where violent crosses are attempted, they usually result in fruit or seed refusing to form, or if the cross is effected, the product may bear flowers, but be wholly barren, or sometimes even refusing to produce flowers at all. These results are partially responsible for the theory, that hybridizing tends to infertility; but not only is this not the case as a rule, but a most emphatic contrary effect is often produced. Referring again to the *gladiolus*: It was not until after years of failure that the first cross was effected, and from this result has the whole mass of commercial hybrids been reared. For the production of this first hybrid made possible the crossing from other and distinct species that formerly could not be induced to blend with either of its parents.

Let us note at this point, "That as individuals of the same species are built up of unstable and easily decomposed chemical compounds, affected by even slight changes of soil and climate, this condition must be more true of hybrid forms, which really means an attempt to make diverse constituents balance in one, resulting in the appearance of many freaks, each with a natural and expected tendency to vibrate towards one or some of its parents." I contend, on the other hand, however, that after distinct removal by years of selection, the effect is to minimize this natural tendency to reversion, and varieties may be sufficiently fixed so as to give them a certain and reliable value, and undoubted individuality; this quality, however, cannot safely be claimed for any variety outside the original locality where its fixity has been attained.

It must not be understood, however, that changes of soil and climate are necessarily unfavorable to the variety, on the contrary, they more frequently exert a beneficial

influence which is particularly apparent where these changes are made with a proper understanding of the principle under which improvement is possible.

The fact that self-fertilization tends to weaken the offspring, and that crosses even between different plants of the same variety give stronger and more productive offspring, to say nothing of the revitalizing effect of distinct outcrosses, must commend the latter course to our consideration and approval. Not only is this of material benefit, but the gain can be increased by effecting crosses between varieties grown in different soils and localities, "because all differences between parents carry new combinations of character, or at least new powers, and the greater the diversity between the limits of variety, the greater is the revitalization," resulting in the production of more pronounced characters, invaluable as the foundation work of new and more beautiful varieties.

In passing, let me say that there are also cases where the process of acclimation temporarily suspends fertility, the plants refusing to produce seed until several seasons of nursing have been given. And in the same line of artificial treatment, the continued propagation from cuttings and offsets has had the effect of seed production being permanently discontinued.

Having already stated that selection is the great force in the improvement of hybrid forms, this may be carried on until a certain point is reached where perfection has its limit. This is more fully exemplified in the *gandavensis* section of the *gladiolus*, which I presume has been more in-bred than any other plant in the world of horticulture. To such an extent has this been carried, that it is considered the most uncertain plant known to the hybridist. I am not referring to every variety in the section, because there are many that show the most satisfactory stability, but on the other hand it is here that the greatest variation in vitality is found. And so finely is this quality equalized in many varieties that a change of soil or climate may unbalance the vital forces entering into their composition, with a tendency to reversion to the most potent species from which they originally descended.

Again referring to the limit of improvement in hybrid forms, this may be carried to such a point, and the vital forces so completely neutralized, that instead of the unbalancing effect induced by change of soil or climate, and resulting in reversion, a temporary period of weak growth may cause complete degeneration to ensue, leaving no vestige of former individuality, and finally the variety itself disappears entirely.

It is at this point, assuming that the variety is one of reasonable excellence, that the hybridist has his opportunity, and by the infusion of new blood from species by a judicious cross, in the product of which, not only is the vitality and strength increased, and greater size and wonderfully increased productiveness added to the bulb, but the flower breaks into limitless variation in form and beauty of coloring.

With the view of indicating the principle of improvement by cross-fertilization, let me note here, that the use of pollen from species or close hybrids on perfected hybrids gives best general results. And to use the species as seed parents gives less diversity, but results in the production of a limited quantity of more distinct and phenomenal character and pronounced racial divergence.

In conclusion let me say, that having for several years devoted myself to the improvement of my specialties with the most exhaustive and untiring energy, the thought comes to me each season, in drawing my work to a close, that the present has only been my initial year. And I am beginning to think, that so great are the possibilities yearly made more apparent by the results of past work, and the discovery of new and distinct species, as the march of exploration and civilization opens up larger fields, that after a life of endless patience and boundless research, ending in results of successful and comprehensive effort, one may only hope to feel as a child who has gathered a few pebbles upon the shore of a limitless ocean.

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ANNUALS FOR THE AMATEUR'S GARDEN.

BY R. B. WHYTE, OTTAWA.

In the preface to his delightful little work on the "Beautiful Flower Garden," Mr. F. Schuyler Mathews says, "I am sure of one thing regarding the extent of our flower gardens to-day, they do not contain half enough flowers—the crops are entirely too small. Let us have all the flowers we can possibly afford; they are the veritable smiles of nature." And he might also have said we have not half enough flower gardens. When we consider how little it costs in time or money to grow even a large collection of flowers, and how much they tend to civilize and refine those who live among them, it is much to be regretted that well-stocked flower gardens are so few and far between. Now and then in our towns and villages we come across a well kept garden, but how rarely in the country where land is so cheap and all the conditions so favorable. If our farming friends only realized how much more attractive they could make their homes for their sons and daughters with the expenditure of a dollar or two, we would not see so many bare, bleak, dreary looking homes when driving along our country roads.

It is not necessary in addressing a Horticultural Society to dwell upon the advantages of growing flowers freely. The question for our consideration is how can we plant our gardens so as to get the greatest return from the space at our disposal, in beauty of form, of color, and of perfume. Some of our garden flowers, as the Rose and Sweet Pea possess all these forms of beauty, but as a rule flowers that have great beauty of form and color, as Asters, Scabiosa, Poppies, etc., lack perfume, or even have a disagreeable odor, as in the African Marigolds, while many flowers with fine perfume are devoid of beauty of form or color, as Mignonette, *Mathiola Bicornis* (Nightscented Stock), etc. Why some flowers have brilliant coloring and others agreeable perfume, you will find fully explained in "Flowers—their Origin, Shape, Perfume, and Colors," by S. G. Taylor.

Flowering plants may be divided into: Perennials, including shrubs, herbaceous perennials, and bulbs, which remain in the ground indefinitely and flower every year. Biennials, which blossom the second year after planting the seed, such as Canterbury Bells, Foxglove, Sweet William, etc. And annuals, which flower and ripen their seed in one season. As very few annuals bloom before July 1st, to have flowers in May or June we have to depend upon the perennial class, the earliest flowering and most brilliant of which belong to the section known as Holland Bulbs.

The snow is hardly gone before the dainty Snowdrop opens its bells, closely followed by the many-hued *Crocus* and the charming *Scilla Sibirica*, the finest blue in nature. And how bare our gardens would be in May without the gorgeous Tulip and the exquisitely scented *Narcissus* in its many forms. The best varieties of these are now so cheap that they can be planted freely.

In early June many of the early herbaceous perennials are in bloom, as the *Aquilegia*, Iceland Poppy, Bleeding Heart, Forget-Me-Not, etc., followed by the *Pæonies*, roses, the first of the lillies, and the earliest annuals. For the best display from July to November we cannot do without some of the summer bulbs, such as *Tigridias*, *Gladioli*, Cannas, Dahlias, etc., and a selection of the herbaceous perennials, but our main dependence for the gorgeous show of color that is possible during these months is upon the annuals. There are no half-dozen perennials that could be named that will give us one-quarter the show of bloom that we can get from the *Dianthus*, Poppies, Sweet Peas, Pinks, *Phlox Drummondii*, Asters, and Scabiosa.

In making our selection from the immense variety of annuals at our command, in addition to beauty of form, brilliant coloring and agreeable perfume, we want convenient habit of growth, for cutting our flower beds would lose half their charm if they did not supply an abundance of flowers for house decoration. We also want profusion of bloom, so that we can cut freely without robbing the garden of its beauty. A long season of

blooming is also a great recommendation, but this we have to a great extent under our own control, as, with most annuals, if we cut regularly and do not allow seed to form, they go on blooming all summer till killed by frost.

Plant as large a variety each year as your space will allow. There are some old favorites that we want every year, but in addition to them it adds greatly to the interest of our gardens to try some new sorts each season, even though they do not come up to the highest standard. I would not like to be without the Carnations, Eschscholtzias, Poppies, Candytuft, Mignonette, Phlox Drummondii, Schizanthus, Stocks, Nasturtium and Pansies. If I was limited to fifteen kinds these are what I would grow. They are all quite hardy, and would give a great profusion of bloom all summer and fall from seed planted in the open air, without the assistance of hot-bed or greenhouse.

There are very many others well worth growing besides these, some of them old favorites; a few of which I will refer to after we discuss in detail the best varieties to grow of the above list.

The first to bloom last season from seed planted in the end of April was the *Dianthus*, or Pinks, which were in flower from June 20th till after hard frost, in great variety of color, from white to the deepest maroon, in single and double. In the singles, *Dianthus Heddegi* in numerous varieties and *D. laciniatus* are the best sorts, and the same varieties double with *D. Chinensis*, Chinese Pinks, and *D. Imperialis*, Japanese Pinks, give blossoms as fine in form and color as the best Carnation. The Margaret Carnation, which is said to bloom in four months from seed planted outdoors, I have not found satisfactory. They are just coming into bloom when caught by frost.

If you are partial to yellow, plant a good sized bed of *Eschscholtzia*. Give it a good sunny situation and a rather light soil, and you will be delighted with the result. They can be bought all colors, mixed or separate. *Mantima*, golden yellow with orange centre, is the best. *Mandarin*, red outside and orange inside. "Californian," are mixed—orange, golden yellow, pink and cream. The doubles are not satisfactory; very few of them come true, and they are not as handsome as the singles. All kinds are very hardy and often grow from self-sown seed. If planted in early spring they are in constant bloom from end of June till frost.

Poppies.—For gorgeous and varied coloring no flower can equal the poppy. They are at their best in July, but if kept picked and not allowed to go to seed, they last till the end of September. The most beautiful of the family are the single Shirleys; for delicacy of texture and exquisite coloring they are unsurpassed. Other good singles are *Lævigatum*, cardinal with black centre, and the larger opium poppy, *Papaver somniferum*. The larger double Poppies, *Pæony florum* and *fimbriatum* and varieties of these all belong to the opium species. The best of the small double Poppies belong to the species *Rhocas*, of which the *Ranunculus* flowered and Japanese Pompon are examples. All the best varieties are treated of in detail in an article on Poppies in the September *Canadian Horticulturist*.

Candytuft is a very pretty, low growing annual in several colors. There are two species, *Coronaria*, always white, flowers in numerous spikes, clustered at the end of the stems, of which the "Empress" is the best known form; and *Umbellata*, lower growing, flowers in flat umbels, a much more desirable species, also in white as well as pink, lavender, purple and crimson. The white is very suitable for growing at the base of tall-growing, bright colored flowers, such as Gladioli, Dahlias, etc. The other colors look best grown separately in small clumps along the border.

Mignonette is only worth growing for its sweet and delicate perfume. It is of no value as a color factor in the garden; the flowers are so small and faint in coloring as hardly to disturb the green effect of the plant. If you want reddish green, grow "Matchet"; for yellowish green try "Golden Queen;" while so called white forms are "Miles Spiral" and "Parson's White." Matchet I find the best kind; the spikes are broader, and do not run to seed as soon as some of the others. If you want nice, stocky plants that will produce good flower spikes all season, you must use your scissors industriously, and do not allow seed to form.

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Phlox Drummondii. Few flowering plants equal phlox in its variety of colors. You may grow it for years and see new shades every season,—every imaginable shade of pink, red and violet as well as white, Nankin yellow and blue. There is no true yellow or scarlet, but almost every other color can be found. The variety "Grandiflora," sometimes called "Jubilee," is very much superior to the ordinary Drummondii in size and coloring. *P. Drummondii fimbriata* is a form with the ends of the petals irregularly toothed, the colors are much the same as the type, and it makes a pleasant variety in form. In the variety "Star of Quedlinburg" the petals are nearly all teeth, giving it the appearance of a five-pointed star with a very small centre, the effect is not pleasant, some of the colors having a decidedly spidery aspect. The dwarf Drummondii are not desirable; the flowers are small and stalks too short. The double variety is not double enough to be effective, and is not nearly so handsome as the single grandiflora. All the varieties come into bloom early in July from seed sown end of April.

Schizanthus, or Butterfly Flower, is a very beautiful flower that is not as well known as it deserves to be. The plant is rather slender and should be grown in clumps so that they can support one another, leaves very finely divided, flowers in loose vacancies at the end of the branches as beautifully colored as the wings of the butterfly, the prevailing tint is lavender, mixed with white, blue, yellow, carmine and purple. They are well adapted for bouquet making, producing a very bright and graceful effect. Seed can be got in separate colors, but is usually planted mixed. Season same as phlox.

Stocks should be extensively grown for their exquisite perfume, one of the finest in nature. To grow fine flower spikes we must have moist rich soil, and not spare the water; if not well grown most of the flowers will come single, and a single stock is not handsome; buy the best seed you can get, as cheap seed is worthless. Our climate is not as suitable as the moist climate of Britain for growing fine Stock, yet, with care, we can grow very good ones, and they are well worth all the attention we can give them. For garden ornament the dwarf ten weeks are the best, but for cutting the colossal ten weeks are more suitable; the most satisfactory colors are white, pink, yellow and carmine. The best way to grow them is in rows pretty close together, and as soon as they bloom pull out the poor colors and single flowers. If transplanted it must be done early as they grow a long tap-root which is apt to break when taken up, if they are more than two or three inches high.

Sweet Peas are deservedly universal favorites, having every good point that we could look for in a flower. In beauty of form and color, from perfume, profusion of bloom, long season, and suitability for cutting, they are unsurpassed. The best varieties and how to grow them are fully described in the *Canadian Horticulturist* for January and November of 1897.

Antirrhinum, or Snapdragon, is an old flower that has been very much improved in size and color of late years. The variety "Magus" has the flower self colored in white, yellow, pink, red, etc., and variety "Picturatum" has the tube light and the lip dark colored or *vice versa*. Both grow about two feet high, with the flowers in long open spikes suitable for cutting. For bedding purposes the dwarf forms are better, variety "Nanum" is about one foot high, and "Pumilum," or Tom Thumb, about eight inches. Season from August 1st till frost.

Salpiglossis is rather a shy bloomer, but is unsurpassed for the velvety richness of its coloring, and such odd peculiar colors as you can get in no other flower, ranging from creamy white to yellow and terra cotta, crushed strawberry to the deepest purples and maroons; the lobes of the corolla and tube streaked and lined with different shades. The Grandiflora variety is the best, growing about two feet high. Season from early August till frost.

Nasturtium. Both dwarf and running varieties are profuse bearers of bright colored showy flowers; the prevailing color is yellow, which shows itself even in the darkest flowers. If you have a mound or stone-pile to cover, there is nothing better, as

they are rapid growers and early bloomers. Give the dwarf kinds plenty of room and don't overfeed them. If in very rich soil the growth of foliage is so rank as to hide the flowers.

Scabiosa. Few annuals are more graceful in habit of growth than the charming Sweet Scabious or Mourning Bride of old gardens, that name appropriate enough to the old dark maroon flower to which it was given, is not at all suitable to the varied and beautiful colors of the modern Sweet Scabious, ranging as they do from white to pale yellow, lavender to dark purple, crushed raspberry and many shades of red to a deep maroon, so dark that it appears black at a little distance. The large double flowers are nearly two and a half inches across, and borne on long thin stems wave gracefully in every passing breeze. Nothing could be better for cutting purposes, not only is the habit of growth suitable, but they can easily be kept fresh for eight or ten days in the house. The plant grows about two feet high, comes into bloom early in August and is covered with flowers till hard frost in the fall. There is a dwarf form about one foot high, that is much inferior in size and doubleness of flower and length of stalk to the tall growing kinds.

Asters. This is the great autumn flower so wonderfully varied in color and form that if we wished to grow all the shades of all the different kinds, we would have to plant over eight hundred packages of seed. Of the Chrysanthemum flowered variety alone some of the German seedsmen offer 214 different shades of color. When all are so beautiful it is very difficult to make a selection and say "these are the best." However, you won't go far astray if you try the "Giant Comet," particularly the white; the pinks and lavenders are rather harsh in shade and don't compare at all in beauty with the white, though there is a pale pink that is fine. The new "Japanese Tassel" is a quilled Aster with long wavy petals, not very double, but the pink and lavender are very beautiful shades. Another good quilled one is the "Washington," with shorter petals but more variety of color; the silver grey and pink of this variety are charming shades. The "Peony flowered" is a large fine flower in many colors. The "Jewel," or ball Aster, is smaller than some of the others but a very handsome sort; the petals are incurved just like some of the finest Chrysanthemums. If you want to grow very large flowers try the "Emperor." Vick" and "Semple's branching" belong to the late flowering section, lengthening the season till frost comes; they are taller growing plants than the others and much more branched, the flowers borne on long stems. The white, pale pink and lavender are very beautiful shades; they are at their best if cut when fully open; if left on the plant, in two or three days they show a yellow centre, which detracts very much from the beauty of the flower. All Asters require very rich soil to do their best. Give them a liberal allowance of well decomposed stable manure, an abundance of water and plenty of room if you want fine flowers for exhibition time. Seeds of the varieties recommended, if planted in the open air in end of April, will give you flowers continuously from early in August till end of October.

Pansies. Though not properly annuals, do best if treated as such and grown from seed every year, if planted early in the spring and well cared for, they will be in good condition in September to give those large beautiful blooms that are so highly prized by all flower lovers. To have flowering plants in spring and early summer, it is necessary either to grow them in a greenhouse, or to plant the seed outdoors the previous August and protect the young plants with straw during the winter. To grow the best flowers, the soil must be rich and moist, the plants kept stocky and compact by pinching back all long straggling shoots, as the blooms are never so good when at the ends of long branches. It is also very important to buy only the best seed, "Cassier" and "Bugnot" are good sorts, "Imperial German" is a very fine strain, "Lord Beaconsfield," lavender and purple is much admired, "Gold Margined," brown and maroon with yellow edge, and "Silver Margined," lighter shades with a white edge are beautiful varieties, all these have the thick velvety petals that are so essential in a good pansy. The "Giant Trimardeau," so much grown, is one of the poorest varieties in substance and color.

Time will not permit of any more than a brief mention of a few of the other desirable flowers. As color factors in the garden a prominent place must be given to the

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Calendulas or Cape Marigolds and the "African" and "French" "Marigolds"; their beautiful yellows and oranges are very effective, and the odour is not very objectionable if you do not handle them.

Though somewhat coarse and rough, the *Zinnia* has some fine shades of color that entitle it to a place in the border.

The *Balsam* has many admirers, the individual flowers, particularly the double white and pink are very handsome, but its habit of growth is against it.

Calliopsis as it is now called, the old *Coreopsis* is very pretty, especially the new varieties "Golden Wave," all yellow and "Coronata," yellow with small red spots near the base of the rays.

As a low bedding plant, the *Verbena* is very fine, it is a slow grower when young, and seed must be sown in a hotbed to have flowers before September.

Some of the new *Petunias* are a great advance over the old rather commonplace flowers, both in shape and color. The seeds are very small and require careful treatment to get them to germinate.

Nigella Damascena, or "Love in a Mist," is a unique flower, unlike anything else in the garden, the large pale blue flowers with their fringe of finely cut leaves have a very pretty effect.

The annual *Gaillardia*, while not equal to the perennial variety, is a very showy plant. *Gaillardia Picta Lorengiana*, a double form not unlike a Sweet Scabious in appearance, makes a brilliant show.

The *Bismarck Larkspur* is a handsome variety in white, pink, blue and lavender.

Lastly, do not leave out a few *Sunflowers*. The common variety and the double "Globosus" are very majestic plants in their proper place, at the back of the border. Among the smaller *Sunflowers* "Stella" is a profuse bearer of handsome yellow flowers three to four inches across.

In conclusion, to get the greatest possible pleasure and benefit from your gardens, besides being able to appreciate beauty of form and color and enjoy agreeable perfume, you should know something of the causes that produce these results, enough of the science of botany to understand the connection that exists between different plants and between the mineral and animal world on each side of them, to know how plants grow and do their work—work that has such an important bearing on our lives. With such a knowledge, it never could be said of you as the poet said of Peter Bell:

"A primrose by the river's brim,
A yellow primrose was to him,
And it was nothing more."

THE CULTIVATION OF WATER LILIES.

By B. E. WADSWORTH, BERLIN, ONT.

This subject has been seldom written up by cultivators of the present day, and I do not propose to do so fully in a short paper such as this, but will merely touch briefly upon points of interest, and methods of cultivation, in the hope that it may draw attention to this most beautiful class of plants, which deserve and no doubt will receive more attention from growers in the near future, as they are rapidly increasing in public favor.

Aquatics were never as much appreciated as they are at present. During the past season this branch of floriculture has formed the centre of attraction in public exhibitions throughout the country. I have been very fortunate in having seen a great many of these ponds. In the public parks of the large cities the introduction of water plants has

done much to educate the public taste for water lilies. In these places they are seen and admired by thousands. The introduction of water affords one of the most effective features in landscape gardening, and when judiciously planted with aquatics it becomes doubly pleasing.

The more the healthy taste for gardening develops the more we return to the natural methods of arrangement. Our gardens are planted more according to natural rules than formerly, and as varied as space and means will permit. With the exception of a well arranged rockery, nothing is more pleasing and interesting than a water garden judiciously planted with aquatics, where both foliage and flowers charm the eye from spring until autumn. A water garden may be either natural or artificial, the former of course always being the more attractive. Where there is a slow running stream or a natural lake or pond with sufficient current to prevent stagnation is the ideal spot, as the bottom is usually muddy the deposit of years of decayed leaves, sand, loam, etc., and therefore well adapted for growing aquatics.

In an artificial water garden care has to be exercised to keep the water constantly changing, especially during hot weather. With this provision there is no difficulty in growing aquatics without either stream or pond by simply having tubs sunk in the ground with about a foot of rich loam in the bottom and water to a depth of eight inches to a foot over that. Sometimes when a piece of water is available it is unsuitable for growing water plants on account of the bottom being rocky or clayey. In such cases, if the water can be lowered, holes may be dug and filled with good meadow loam, or where this cannot be done they can be planted in tubs and sunk. Often, in planting, it is necessary to attach stones to the tubs to keep them from rising and floating away. Many are no doubt deterred from the cultivation of these beautiful plants under the impression that the possession of natural ponds or a large outlay of money to provide proper conditions is necessary, but this is not so. Many of the finest and rarest water lilies are grown in tubs in small gardens and even in city or town lots.

The arrangement and grouping of plants in ponds is important. On no account should strong growing subjects, especially those with large shade-giving leaves, be planted near to weak growing species, or the latter will be crowded and killed. The best time to plant is in spring after the weather gets warm. The depth of water should not exceed four feet and there should be a shallow margin to allow the growing of *Limnanthemum*, *Lacunosum*, or *Brasenia*, which require shallow water for their development. There are plants that under ordinary circumstances grow high above the water. Others, such as *Nymphaea* whose leaves float on the water, and for the sake of arrangement in planting, I will divide them into erect grow in aquatics and floating plants, enumerating only the most important.

Nymphaea: This, the true water lily genus, is a most important aquatic class, all the species are beautiful in flower and distinct in foliage. The blooms range from pure white to deep crimson and royal purple, the culture of these lilies is fascinating and most of the varieties are entirely hardy.

The hardy varieties are as follows:

Nymphaea alba candidissima: A large flowering variety with broad petals of the purest white.

Nymphaea alba: The English water lily. Flowers pure white; a hardy and fine species.

Nymphaea flava: A beautiful water lily; flowers golden yellow; of free growth; fragrant.

Nymphaea Laydekeri rosea: Flowers delicate pink, with deep yellow centre, a fine grower.

Nymphaea Marliacea carnea: A magnificent flower of flesh tint, a delicate blush, vanilla scented.

Nymphaea Marliacea rosea: Flowers soft rose of exquisite tint, a beautiful variety.

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Nymphaea odorata: Our native white water lily, well known for its beauty and fragrance.

Nymphaea odorata exquisita: Another grand variety of the *Odorata* type, flowers large, rosy carmine.

Nymphaea odorata rosea: This is the pink Cape Cod water lily, flowers of deep pink shade, deliciously fragrant and a free bloomer.

Nelumbium luteum: (America Lotus.) Although a native of North America it is extremely rare, it thrives under the same conditions as the preceding, flowers rich yellow.

Nelumbium speciosum: (The true Egyptian Lotus.) Flowers when first open, a beautiful rose pink; when fully expanded, creamy white and pink; quite hardy.

TENDER VARIETIES: These should be taken inside in winter.

Nymphaea cerulea: Flowers, six inches in diameter; color, lavender blue; very fragrant.

Nymphaea Devoniensis: One of the rarest as well as one of the most beautiful water lillies. Though tender, it succeeds well outdoors in summer in tubs or ponds; color, deep rose red.

Nymphaea dentata: Flowers white, open horizontally, eight to ten inches in diameter, fragrant.

Nymphaea gigantea: One of the best in cultivation; large purplish flowers with immense petals and a deep mass of golden yellow stamens.

Nymphaea Zanzibarensis: The deepest colors, as well as the largest flowers of all blue water lillies, and one of the most beautiful; flowers, ten to twelve inches in diameter, fragrant, a magnificent species.

Without exception the *Nymphaeas* are all handsome, and since several new hybrids have been added the interest in the class has been increased, especially as they can be grown in an inexpensive way by sinking tubs of water in the ground where no larger piece of water is available. By growing a collection of about four or six varieties, bloom can be had from June to October.

To those having a pond I would advise trying some floating aquatics, *Acorus Calamus* (Sweet Flag), *Calla palustris*, *Ouvirandra Crassipes* (Lattice Leaf Plant), *Pontederia cordata* (Pickrel Weed), and *Eichheornia crassipes major* (the Water Hyacinth). This is the plant that is causing so much trouble on the St. John's river, Florida; being attractive, it was planted by settlers along the river, but its rapidity of growth is a serious matter as it is now an impediment to navigation.

The cultivator of aquatic plants when once launched will find a field of never-failing interest and enjoyment.

REPORT OF NEW FRUITS COMMITTEE.

Mr. L. Woolverton stated that Mr. John Craig, of Ottawa, was the Chairman of this Committee and had all the notes and other material in hand.

Owing to his absence this report was not at hand, and Mr. Woolverton could only present brief notes on two or three fruits which he had brought with him.

APPLES.

KEAN'S SEEDLING. Grown by Josiah Kean, Fesserton, Simcoe County, Ont. Six samples received 27th Nov., 1897, with the following notes from Mr. A. Paterson, of Cold Water, who sent it:

"The tree Mr. Kean thinks, or rather the seed, was planted about 1880 or 1882. It has fruited successfully for eight or nine years. Upright grower, vigorous, very hardy and very productive, carries its fruit well until ripe. The fruit is entirely free from spot or blemish, quite uniform in size, season October to January, (but has been kept till March.) I will be pleased to give any further information or forward scions if required."

The apple is remarkably fine in appearance, reminding one of the Maiden's Blush, which it exceeds in size, judging by the samples received. Form oblate, regular, skin yellow with bright red cheek, stalk one and a quarter inches long in a even russeted cavity, segments of calyx large, half open, in a large evenly formed basin; flesh white, fine grained, tender, good flavor, desirable for either dessert or cooking. Well worthy of further trial.

STANHOPE. Sent by Thos. Beall, of Lindsay, Oct. 20th, 1897; seedling from Township of Stanhope, fifty or sixty miles north of Lindsay, previously reported favorably upon by Fruit Committee, and worthy of attention, especially as a fall cooking apple for October and November. Fruit large, yellowish, with splashes and stripes of bright red; flesh white, tender, subacid—desirable for cooking.

PLUMS.

SMITH'S OCTOBER. Samples from A. M. Smith, received October 20th, 1897, in good condition.

FRUIT medium in size, roundish; skin thin, dark purple with greyish brown; flesh dark yellow, tender, juicy, flavor rich, sweet and very agreeable; season end of October; quality first-class.

ORGANIZATION OF AFFILIATED SOCIETIES.

BY THOS. BEALL, LINDSAY.

The project of organizing horticultural societies in many of the cities, towns and incorporated villages of this Province in strict accordance with the *several* provisions of the Agricultural and Arts Act, and thereby securing to the inhabitants of such municipalities the great advantages concisely set forth in sub-sec. 2 (of section 9) with its five sub-divisions, and of getting such societies to affiliate with this Association, was first brought to the notice of the directors of this Association at its annual session in (I think) 1892. The desirability of having such a work prosecuted was at once admitted by the whole Board; and the plan of operation as laid down by the writer of this report seemed so simple that a resolution was unanimously passed giving the directors authority to organize horticultural societies wherever necessary in the cities, towns and villages in their respective Agricultural divisions; and that the necessary expenses incurred for this work be paid by this Association. At the next annual meeting, when reports from the several directors were called for, each of them, with one exception, stated; that the plan as proposed at the last annual meeting for organizing such societies, although exceedingly simple in theory, was altogether impracticable in fact, and that nothing had or could be done in this line by any of them. The one exception was the director for the 5th division, who reported that he had succeeded in getting one other such society organized in his division; and also that he could see no insurmountable difficulty in getting one or more such society established in almost every county in the Province. After some considerable discussion the subject was placed in the hands of the Executive Committee with power to act in the best interest of this Association. The Committee after due deliberation decided to employ the writer of this report to make the attempt to organize a few such societies in such municipalities as he might be able to reach at the least expense. The work was in due time commenced, with the understanding that a constant communication be maintained between the organizer and the committee, and that the organizer might be recalled at any time at the will of the committee. The committee soon learned that the work was being successfully carried on, and at the same time found

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that the expense in connection therewith was necessarily heavy, and, perhaps, might hardly be justified, but for the probability that the societies so formed might possess sufficient vitality to become practically self-sustaining after the first year, and if this should prove to be true the organization of such societies would prove to be of the utmost advantage of this Association, and should be continued from year to year until one society at least should be organized in each riding or county in the Province.

As several years have elapsed since this work was begun, and as a considerable sum of money has been expended in this work, it may be well to review what has been accomplished.

In 1895 there were eleven societies in operation, having a membership aggregating 798. The next year seventeen societies were in existence, aggregating 1,197 members; and in 1897 the numbers of societies had increased to twenty-seven, aggregating 2,076 members, making a total membership for three years of 4,071.

To ascertain more clearly, however, if the expenditure referred to had been justified by results, it may be more satisfactory to take the membership of the eleven societies on which the cost of organization had been borne by this Association in 1895 and note the results for the following two years. The total membership of the eleven societies in that year was, as before stated, 798. In 1896 the membership of the same eleven societies amounted to 826, and in 1897 to 899, or a total membership for the three years of 2,923. Now, if the membership of the eleven societies which were in operation in 1895, consisting of 798 persons was sufficient to justify the expenditure on that account, for that one year, (and I understand from the committee that it was) then the success of the undertaking can be understood when it may be observed from the above that these societies during the following two years contributed 1,125 additional membership without any expenditure on the part of this Association, and there seems good reason for believing that not only the eleven but the whole twenty-seven societies will continue to contribute their membership in like proportion for many years to come.

So much may be said respecting the increase of societies and consequently of increased membership. But who may estimate the amount of "encouragement to improved horticulture" in these twenty-seven communities by the monthly distributing therein of upwards of 2,060 copies of the *Canadian Horticulturist*, the same number of bound copies of the Annual Report yearly, and a lecture by an expert horticulturist once a year? And again: Who may estimate the impetus given to "improvement in horticulture" by the enormous quantities of new plants, bulbs, trees, seeds, shrubs, etc., which has been distributed among the members in each year since the organization of these societies. Some faint idea of the enormous supply of the good things distributed may be learned by observing that the Napanee Society—one of the smallest in the Province in point of members—has given to its members, equally, in equal shares, during the past three years, upwards of 15,000 of the newest and most beautiful varieties of plants, bulbs, shrubs, etc., that could be obtained, besides fifteen pounds of the choicest varieties of flower seeds, most of which were more expensive than are usually purchased by ordinary growers.

MR. BEALL, seconded by MR. ORR, moved a resolution of thanks to the mayor and citizens of Waterloo, and to the local Horticultural Society, for assisting in making the convention a success; to the press, and to the speakers and writers of papers, which was heartily adopted.

THE PRESIDENT: It will be impossible for me to convey thanks personally to the different parties mentioned, but I wish to say to Mr. Lockie and the members of this Society that we have enjoyed our visit to Waterloo. We hope that what we have had here will be of interest and profit to the members of your Society and your townspeople generally, and we hope that any interest which you have evinced in the past will be increased in the future.

The President invited the audience to examine the fruit and flowers, and declared the meeting formally closed.

LIST OF AFFILIATED HORTICULTURAL SOCIETIES.

Names.	President.	Vice-President.	Secretary.	No. of members.
Belleville	W. C. Reid	S. J. Wedden	W. J. Diamond	66
Brampton	Dr. C. Y. Moore	Wm Kemp. H. Dale	Henry Roberts	112
Burlington	George E. Fisher	J. Jeffers. J. S. Freeman	A. W. Peart	
Campbellford	Freeman P. O. J. B. Ferris	Freeman P. O. Mrs. W. E. Cooper	Freeman P. O. E. A. Bog.	53
Chatham	Wm. Ross	D. Kennedy. Mrs. Coatsworth	George Massey	55
Cobourg	J. D. Hayden	John Fisher	H. J. Snelgrove	94
Durham	C. Firth	Col. H. H. Skill. Gilbert McKechnie	Wm. Gorsline	108
Grimsby	Mrs. E. J. Palmer	Thomas Brown. L. Woolverton	E. H. Read	74
Hagersville	Wm. Harrison	Mrs. A. G. Pettit. D. J. Lindsay	S. W. Howard	51
Hamilton	A. Alexander	Thomas Harris. W. F. Burton	J. M. Dickson	72
Iroquois	W. A. Whitney	Wm. Ogilvie. Mrs. Alva Brouse	A. E. Overell	50
Kincardine	A. C. Washburn	Dr. John Harkness. George Sturgeon	Joseph Barker	59
Leamington	J. L. Hilborn	Mathew McCreath. John D. Ross	E. E. Adams	87
Lindsay	Col. J. Deacon	A. Cathro	F. Frampton	111
Meaford	O. Boden	R. Chambers. Chas. Ellis	A. McK. Cameron	72
Midland	W. J. Parkhill	Mrs. P. Potvin. Mrs. John Rowe	Miss M. Tully	54
Napanee	Mrs. W. H. Wilkison	T. M. Henry	J. E. Herring	66
Niagara Falls South	W. P. Lyon		Thos. J. Robertson	97
Oakville	George A. Jacobs	Claude C. Heaven	W. W. Paterson	95
Orangeville	John McJaren	A. D. Chisholm. W. L. Walsh	Wm. Judge	53
Owen Sound	Archdeacon Mulholland	Henry Gillespie. Thos Gordon	Jas. H. Packham	56
Paris	P. Buckley	Richard Trotter. A. G. H. McCormick	C. H. Roberts	59
Pictou	Thomas Bog	J. R. Brown	Walter T. Ross	83
Port Colborne	W. W. Kinsley	Mrs. H. W. Branscombe S. J. McCoppen	A. E. Augustine	51
Port Dover	James Symington	Mrs. D. W. Carter. Peter Lawson	W. J. Carpenter	70
Port Hope	H. H. Burnham	Wm. Stamp. Wm. Craig	A. W. Pringle	120
Sarnia	Hon. A. Vidal	Peter Brown. T. C. Wheat'ey	T. G. Gordon	71
Seaforth	B. B. Gunn	James Macklin. Mrs. T. O. Kemp	F. G. Neelin	69
Simcoe	H. H. Groff	Mrs. C. W. Papst. J. H. Ansley	Henry Johnson	66
Smith's Falls	Dr. J. S. McCallum	W. F. Kydd. Mrs. Wm. Richey	R. Graham	146
Stirling	Mrs. James Boldrick	Mrs. George Steele. J. S. Carstairs	James Currie	51
Thornbury	Joseph Dibbs	Mrs. E. F. Parker. Mrs. W. L. Tyson	Miss Helen Henman	53
Trenton	Dr. W. S. Jacques	Dr. Hurlburt. Mrs. W. H. Berkinshaw	S. J. Young	59
Waterloo	James Lockie	Mrs. J. H. Stewart. George Bolduc	J. H. Winkler	155
Woodstock	D. W. Karn	Mrs. P. Hopmeier. G. R. Pattullo	James S. Scarf	68
Windsor, Sandwich and Walkerville	Stephen Lusted	T. H. Parker. Elias Wills	F. P. Gavin	54
	Windsor P.O.	Windsor P.O.	Windsor P.O.	
		Donald Grieves, Windsor P.O.		

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